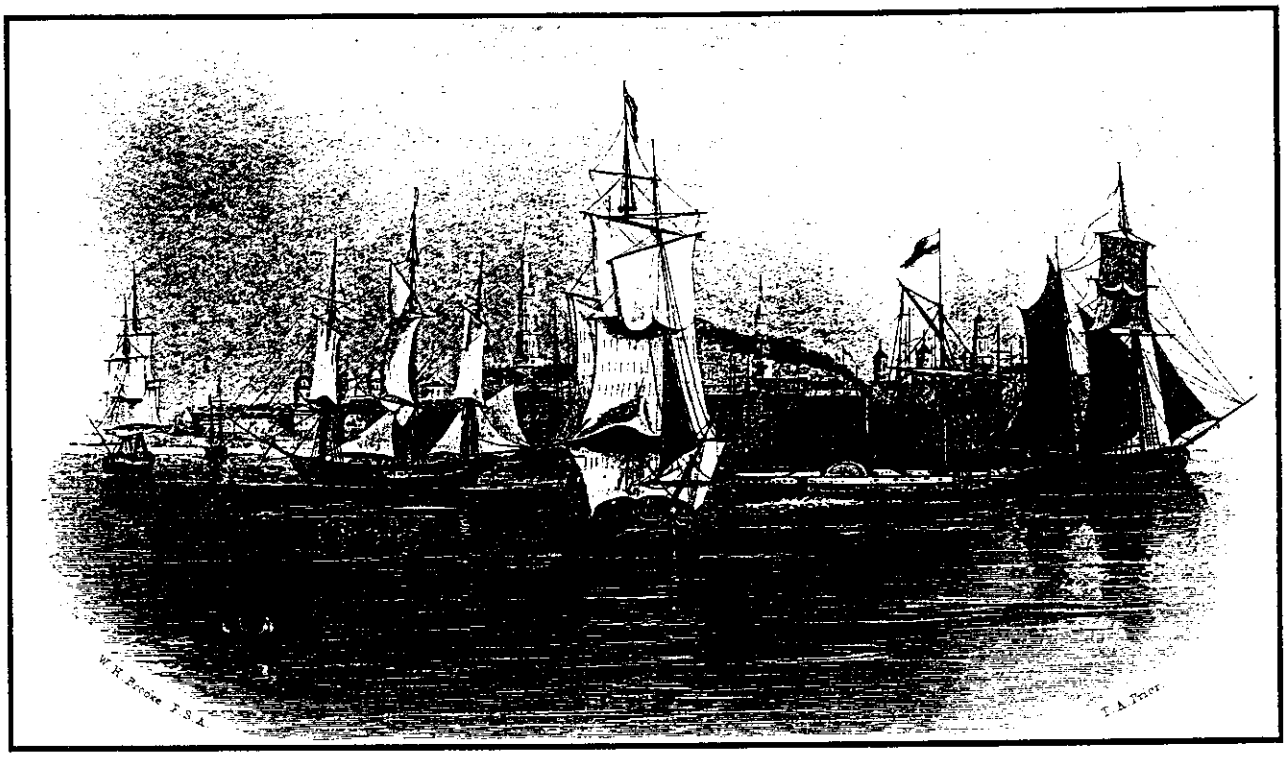
A Submerged Cultural Resource Management Document and GIS Database for the Charleston Harbor Project Study Area, Charleston, South Carolina



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15 April 1995

Abstract

The submerged cultural resources of the Charleston Harbor area represent an integral part of the fabric of South Carolina's maritime heritage. Those resources also preserve an important physical record of Charleston's development. Properly preserved and recorded, the remains of sunken ships, inundation sites and maritime related structures can provide South Carolinians with insight into their past that is otherwise unavailable in the historical record. That unique and finite archaeological record belongs to all South Carolina citizens. To ensure that South Carolinians receive maximum benefit from the archaeological evidence associated with their maritime heritage, the Charleston Harbor Project and the South Carolina Coastal Council contracted with Tidewater Atlantic Research, Inc., of Washington, North Carolina to develop a management document and GIS database. That plan and database have been designed to aid the protection and preservation of submerged cultural resources within the Charleston Harbor Project study area. Tidewater Atlantic Research has created a resource management document, as well as GIS database for inclusion in the Charleston Harbor Project computer system. The products of this research will provide both an historical and cultural background and readily accessible and updatable database for Charleston Harbor submerged cultural resources. Rather than a definitive system, the management document and database represent points of departure. The Charleston Harbor GIS database can support an active program which can be developed, updated and expanded to serve both present and future resource management activities.

Table of Contents

List of Figures

Introduction

The Charleston Harbor Project is a five year Special Area Management Plan designed to examine the impact of development on the Charleston Harbor estuary system. This system includes the Harbor, Ashley, Cooper, Wando and Stono Rivers, their natural and cultural resources, and the lands that adjoin them. The goals of this project are to enhance the quality of the environment while maintaining the many uses of the waters and natural resources, and to anticipate and act on potential problems before they harm the harbor system. In order to formulate a comprehensive plan, the project has identified a series of priorities which include the development of a submerged cultural resource management document for the Charleston Harbor Project study area (Figure 1).

For over 300 hundred years, Charleston, South Carolina has been an one of the most important seaport and maritime areas in the southeastern United States. As a result, Charleston Harbor and the surrounding river systems have become an important repository of submerged cultural resources. Moreover, these resources preserve an important physical record of American and southern maritime history. In order to preserve the archaeological record associated with Charleston's maritime heritage, submerged archaeological resources must be identified and protected. The basis of effective management includes both a planning document and an understanding of the nature and scope of the resource base.

Tidewater Atlantic Research (TAR) has developed a submerged cultural resource management document and a Geographic Information System (GIS) database for the Charleston Harbor Project study area. The management document provides GIS data regarding known submerged cultural resources and historically documented sites as well as potentially sensitive archaeological areas. GIS provides resource managers with a quick and efficient means of accessing computerized data regarding Charleston's submerged cultural resources. For example, rather than performing manual searches, the GIS system allows users to query computerized site information by selecting an onscreen "site symbol," such as a red triangle, displayed on a digitized USGS 7.5 minute quadrangle map. The user may also query the GIS for information regarding submerged cultural resource sensitivity zones. These zones, developed using a variety of inputs, including historic activity, known submerged archaeological resources, and levels of bottom disturbance activity, provide the user with a more complete picture concerning resource sensitivity within a designated area.

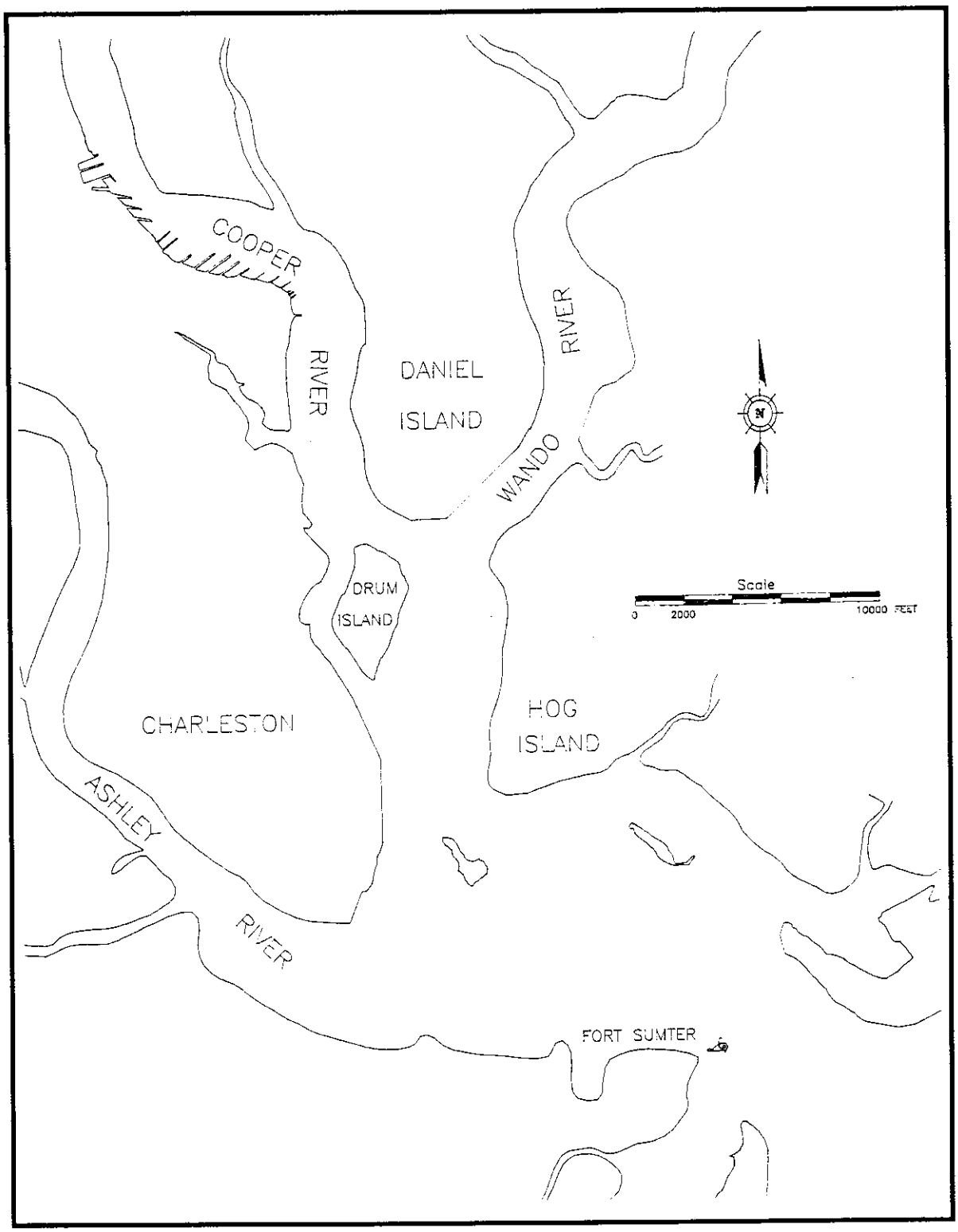


Figure 1. **Charleston Project Area Map.**

Cultural resources are protected by a variety of regulations and orders designed to guide the activities of all Federal agencies and Federally permitted projects. Specifically, Sections 106 and 110(f) of the National Historic Preservation Act of 1966 as amended require that agencies assess the effects of Federal, federally assisted, or federally licensed projects on properties included in or eligible for inclusion in the National Register of Historic Places. The section 106 process has been designed to address historic preservation priorities. Consequently, GIS facilitates a more effective, project specific 106 Review and Compliance process. In conjunction with GIS development, TAR also produced a resource management document. This document presents an overview of the area's history, the types of archaeological resources and their significance, legislation and regulations, as well as the state and Federal agencies responsible for protection and management.

The South Carolina Institute of Archaeology and Anthropology (SCIAA) is the key agency in ongoing efforts to preserve South Carolina's submerged cultural resources. In fact, the South Carolina Antiquities Act of 1991 designated SCIAA as the custodian for all historic submerged archaeological resources contained within the state's submerged lands. It is hoped that the management document and Charleston Harbor GIS database developed by Tidewater Atlantic Research will prove to be a useful tool to assist both the Charleston Harbor Project and the South Carolina Institute of Archaeology and Anthropology preserve the irreplaceable physical record of South Carolina's maritime heritage.

Project Location

The City of Charleston, South Carolina is situated on a narrow peninsula at the confluence of the Ashley and Cooper Rivers. The Charleston Harbor Project study area encompasses the Charleston Harbor drainage basin. It includes the Charleston Harbor, the Ashley and Cooper Rivers, as well as sections of the Stono and Wando Rivers. The submerged cultural resource inventory and management document development project included the inner harbor, the Ashley and the Cooper River basins and portions of the Stono and Wando River basins.

Description of Project Activities

Historical Research

The literature and archival investigation was initiated by surveying secondary source materials associated with the historical development of Charleston and eastern South Carolina. The survey focused on documentation of activities such as exploration, colonization, development,

agriculture, industry, trade, shipbuilding, commerce, warfare, transportation, and fishing that would have contributed to the region's submerged archaeological record in the project area. In examining each of these factors, special attention was devoted to activities associated with the Charleston area, including the Ashley, Cooper, Wando, and Stono Rivers. Because TAR has carried out a number of submerged cultural resource related projects in Charleston, much of the historical background, literature and resource specific research had been completed prior to initiating this project. That resulted in a considerable cost savings and permitted maximum attention to be focused on development of the GIS program and database.

The literature and archival investigation, initiated by surveying secondary source materials associated with the historical development of Charleston and the surrounding area, focused on the identification of historic areas of cultural activities, as well as historic vessel losses. Documentation of activities such as colonization, development, agriculture, industry, trade, shipbuilding, commerce, warfare, transportation, and fishing were noted and evaluated for their project relevance.

Preliminary wreck specific information was collected from secondary sources including the *Encyclopedia of American Shipwrecks, Merchant Steam Vessels of the United States 1807 - 1868, Shipwrecks of the Western Hemisphere, Shipwrecks of the Civil War, Shipwrecks of South Carolina,* the *Official Records of the Union and Confederate Navies in the War of the Rebellion* and the *National Political Manual* (1868) and other published material. Additional information was generated by a survey of selected South Carolina newspapers, the Wreck Information List of the U.S. Hydrographic Office, the National Oceanic and Atmospheric Administration Snag Log, and maritime records associated with the Port of Charleston. Historic maps and charts preserved in the collections of the South Carolina Archives, the South Carolina Institute of Archaeology and Anthropology, and other South Carolina repositories were also examined.

Relevant manuscript sources of shipwreck data preserved in the South Carolina State Archives, South Caroliniana Library, University of South Carolina Library, South Carolina Department of Archives and History in Columbia, and the South Carolina Historical Society Library, Charleston Public Library, and Charleston Historical Society were surveyed for site specific data associated with Charleston history. The submerged cultural resource site file inventory of the Institute of Archaeology and Anthropology, Columbia, and the Program in Maritime History and Underwater Research at East Carolina University in Greenville, North Carolina, were also reviewed for underwater sites in the study area.

At each repository, the collections were examined for specific references to the study area. The staff of each repository and knowledgeable local researchers were interviewed for source materials. TAR contacted and interviewed the State Historic Preservation Officer (or appropriate staff), State Archaeologist (or appropriate staff), local archaeologists, historians, and other individuals knowledgeable in maritime history and shipwreck research to solicit their assistance in generating wreck data.

TAR personnel examined the site file inventories of the South Carolina Institute of Archaeology and Anthropology (SCIAA) in Columbia, South Carolina. The investigator conferred with Keith Derting at SCIAA in regards to recorded archaeological sites in the area, as well as to discuss the possibilities of encountering evidence of prehistoric or historic cultural activities. A comprehensive examination of the bibliography of archaeological reports compiled by SCIAA was undertaken to ensure that all relevant site surveys were consulted. Consultation with Lee Tippet at the SHPO provided additional information regarding the region's historic development.

Cartographic Research

Cartographic research identified a variety of maps and charts illustrating human activity along the Charleston Harbor Basin. During the survey, maps and charts were systematically examined for data related to historical and archaeological sites. Map indexes were checked for shipwreck and navigational reference data. Tidewater Atlantic Research identified and inspected pertinent historical maps to locate known and potential areas of historic land use. The earliest maps were associated with the settlement of Charleston and included the John Culpepper map of 1671. Maps from the eighteenth century produced information about settlement and navigation. Without question, the most comprehensive and informative maps dated from the nineteenth century, when improved cartography made maps and charts more accurate. Maps produced in the twentieth century provided further insight into the Charleston Harbor Basin and confirmed previous cartographic documents. Features were identified and correlated with sites identified during the field investigations. A synopsis of the cartographic data associated with each map is included in Appendix B.

GIS Development

The use of Geographic Information Systems (GIS) has grown rapidly in the last decade. Primarily, GIS has been a tool for resource managers, planners, and more recently archaeologists. GIS consists of an integrated program that provides a relational, as well as a graphic database. The strength of GIS, as it

relates to archaeology, is its ability to present spatial, temporal, and form data simultaneously (Allen *et. al.* 1990:5). In cultural resource management, GIS has primarily been a tool to facilitate problem solving through the use of integrated, spatially referenced data (Marble 1990:5). In essence, that approach seeks to locate areas of sensitive archaeological sites before development, and consequently preserve or recover the archaeological record while allowing growth and development (Allen *et. al.* 1990:26). Through the use of GIS, the efficiency of the archaeological compliance process can be enhanced. It can decrease the cost of archaeological research as well as preserve a higher percentage of archaeological sites (Allen et al 1990:26). In short, GIS allows archaeologists, developers and ultimately the community to benefit.

Due to a dearth of information regarding historic site predictive modeling, particularly for submerged sites, TAR personnel utilized a methodology previously employed by South and Hartley (1980), Hartley (1984), and Ferguson (1986) to locate seventeenth, eighteenth, and nineteenth century terrestrial sites within the Charleston area. By examining historic maps, and hypothesizing that the settlers desired "deep water and high ground," South, Hartley and Ferguson successfully located numerous historic terrestrial sites illustrated on historic maps. Further research has shown that settlement along waterways with sufficient water depth and land elevation continued throughout the nineteenth century.

In order to prepare a sensitivity analysis regarding submerged cultural resources in the Charleston region, TAR personnel implemented a similar framework based on the direct historical approach. That methodology was based on the examination of historic maps to identify activity areas. The "deep water and high ground" concept of settlement patterns was a key factor in isolating high priority resource areas. The TAR submerged cultural resource analysis was not an exact, but rather a general analysis. While the random nature of vessel loss associated with storms and other unpredictable catastrophes, cannot be fully quantified, an examination of the historical record associated with settlement patterns, regional economics and the environment provided insight into areas of high potential sensitivity for submerged cultural resources.

Mapping historic activity areas along the waterways was of primary importance to the project. Since previous research has demonstrated that settlement in the Charleston area developed in close proximity to the waterways, especially along the Cooper, Ashley, Wando, and Stono Rivers. The identification of historic activity areas, such as brickyards, plantations, and landings, aid researchers and resource managers in defining high probability areas for submerged cultural resources. Based on previously documented submerged sites in the Charleston project area, researchers found that submerged archaeological sites may be an extension of, or

associated with, terrestrial sites (Errante 1993:58, 62). Consequently, by mapping areas of historic cultural activity, researchers may begin to observe regional patterns in relation to maritime activities.

TAR personnel also utilized historical records of river and harbor improvements, particularly in relation to U.S. Army Corps of Engineers dredging activities, to identify previously disturbed bottom lands in the project area. Previous submerged cultural resource remote sensing and archaeological site survey data were also included in the GIS database. The combination of previous dredge and survey activity aided the further delineation of sensitivity areas regarding submerged cultural resources.

Using the direct historical approach, historic maps and charts were analyzed for areas of cultural activity, particularly in relation to shipbuilding, shipping, and other activities impacting the scope and nature of the submerged archaeological record. Included in those historic areas were plantations, landings, shipyards, ferry crossings, brickyards, forts and redoubts, as well as shipwrecks. A comparison of historic maps with present day USGS 7.5 topographic maps revealed a striking similarity between physiographic aspects of project area rivers and streams. Landmarks such as river bends and tributaries and written historical records permitted TAR personnel to employ a computer assisted design program (AutoCAD) to identify historic areas on digitized current USGS 7.5 topographic maps. Using a geographical information system program (ArcCAD), those areas were then developed into an ARCINFO compatible GIS layer or coverage.

The historic areas coverage enabled Tidewater personnel to develop a geographic framework for settlement and maritime activities along the project area's waterways. In addition, a database containing all input historic areas was created to provide a name, description, and reference for each individual area. Consequently, the end user may select a graphically displayed symbol for each historical area and obtain the database information.

Previously surveyed areas were also delineated and digitized into AutoCAD. The survey areas were then used to create a GIS "coverage" within ArcCAD. Those survey areas could then be layered on areas of historic and channel maintenance activity. Each survey coverage includes a database with the project location.

Inclusion of the project area's documented submerged archaeological sites was a principal element in GIS development. TAR personnel, therefore, met with Mr. Keith Derting of the South Carolina Institute for Anthropology and Archaeology to obtain data on known submerged sites within the project area. This data is important because it increases the ability of various regulatory

agencies, such as the South Carolina Coastal Council and the South Carolina Institute for Anthropology and Archaeology, to effectively administer South Carolina's Public Notice Review System.

Site locations were then input into the CAD drawings and used to create a GIS coverage for known submerged archaeological sites. A database containing site specific information was also created within ArcCAD and linked to each individual site location within the GIS site coverage. The database connection allows end users to query individual sites for specific information, such as location, type and National Register of Historic Places significance.

The final segment of GIS development pertained to the creation of "sensitivity" zones. By using GIS map overlay techniques, TAR personnel examined the spatial relationship between the previously described coverages. By overlaying the various historic, dredging, and remote sensing survey coverages, one may examine the relationship between areas of historic significance, the level of possible site disturbance, as well as the level of archaeological survey. TAR personnel then assigned a sensitivity rating (1-high, 2-moderate, 3-low) to each zone. The rating was based on the number of submerged archaeological sites, the level of historical activity, the intensity of previous surveys, the level of dredging and channel maintenance activity, and projected population growth within each particular drainage basin. Users may query the GIS for zone specific information, such as sensitivity rating, USGS quad, body of water, previous survey activity, known archaeological sites and historic activity along the waterway.

Charleston Area Prehistoric Background

Investigation of the archaeological evidence associated with prehistoric populations on the South Carolina coastal plain has confirmed that developmental patterns correspond closely with those generalized for the Southern Atlantic states. While the proximity of the Atlantic Ocean contributed to regional variations in those patterns, three major periods of cultural development have been confirmed. These have been identified as the Paleo-Indian, Archaic, and Woodland (Developmental and Climatic) Periods (Coe 1952). These periods of development follow the general pattern originating with hunting and gathering and ultimately terminating in a fishing, hunting, gathering, and horticultural subsistence around the time of European contact in the seventeenth century.

Paleo Period

Chronologically, prehistoric development has been characterized as beginning with the Paleo-Indian Period that began as early as 12,000 B.C., and continued until approximately 8,000 years B.C. (Trinkley and Tippett 1980). This early cultural tradition has been characterized by basely thinned, side-notched projectile points, fluted lancealate-shaped projectile points, side scrapers, and drills associated with hunting Pleistocene fauna (Trinkley and Tippett 1980). While gathering wild plant foods probably made a significant contribution to Paleo-Indian diets, the emphasis was on hunting (Griffin 1952). As the Paleo-Indian population lacked the technology to store food, their existence was closely related to available resources. However, by the Middle Paleo Period, environmental change may have dictated modifications to hunting traditions due to the elimination of Pleistocene megafauna. This change would have required a more diverse subsistence, including utilization of both vegetation and aquatic resources (Davidson 1982:15-16). These changes perhaps characterized the transition to the adaptive pattern of the Archaic Period.

Archaic Period

The Archaic Period began around 8,000 years B.C. and lasted until approximately 2,000 years B.C. (Trinkley and Tippett 1980). It is associated with the Atlantic climatic episode and was marked by the dramatic environmental change that characterizes the appearance of the Holocene in the Middle Atlantic area. The pre-Boreal conditions that existed during the late Paleo-Indian Period were transformed into a Boreal environment, producing vegetation similar to that surviving in the region at present. During that time, prehistoric inhabitants of the area relied less on hunting and made more extensive use of plant food sources. Adaptations to the Holocene environment are characterized in lithic material by bifurcate base projectile points, although a variety of stemmed points have been recognized as diagnostic of Archaic cultural traditions surviving as late as 1000 B.C. in many parts of the Middle Atlantic (Kraft 1977). Significant changes in climate, environment, and the lifeways of the prehistoric population are apparent in the archaeological record by 2,000 B.C., and that date has been accepted as indicative of the end of the Archaic.

Woodland Period

Fiber-tempered ceramics termed Stallingsware (Fairbanks 1942) began to appear in South Carolina at about 2,500 B.C. (Stoltman 1966), indicating the beginning of the Woodland Period. Unlike the mobile lifestyles of the Paleo and Archaic, Woodland lifestyles, as a response to the onset of the mid-post-

glacial xerothermic, were more sedentary and focused on high-order water courses or especially productive estuaries. Larger populations became more stratified and are characterized by Stallings and Thom's Creek pottery, as well as cord-marked, fabric-marked, and net-impressed ceramics. These styles link South Carolina pottery with contemporary styles to the north (Trinkley and Tippett 1980).

The Climatic Phase of the Woodland Period is marked by the presence of temple mound complexes and complicated stamp pottery which show evidence of influence from the Savannah and Irene cultures in Georgia and the Pee Dee culture in North Carolina (Ferguson 1971). The Woodland Period can be identified by several distinctive characteristics. One of the most notable was the development of estuarine and riverine adaptations that were stable and intensive enough to produce large macro-band base camp sites in the zone of freshwater/saltwater interface along the major drainages. Population growth was also reflected in single site locations that produced sites much larger than Archaic macro-band camps. In addition, Woodland inhabitants utilized foraging and collecting in areas less productive than the estuarine and riverine settings. Participation in large scale exchange networks has also been identified as characteristic of the Woodland period, along with occasional participation in complex mortuary ceremonies, such as cemeteries and rich grave offerings.

Proto-Historic Period

The Proto-Historic Period begins with the first European contact, around 1650, and ends with the establishment of an English settlement at Charles Towne in 1670. The Proto-Historic Period was marked by occasional contact between the Coastal Plain tribes and Europeans. Although a lack of research data hinders the definition of Proto-Historic cultural systems, ethnographic accounts recorded by Hilton (Cheves 1897) and Lawson (Harris 1952) provide insights into their lifeways and customs.

Charleston Area Historic Background

Colonial Period

The establishment of Charles Towne in 1670, on the west bank of the Ashley River, marks the beginning of English settlement in South Carolina (Figure 2). Due to the strategic vulnerability of the Ashley River site, the colonists moved in 1680 to Oyster Point, located at the confluence of the Ashley and Cooper Rivers (Waring 1970:22-24). The new site benefited from increased

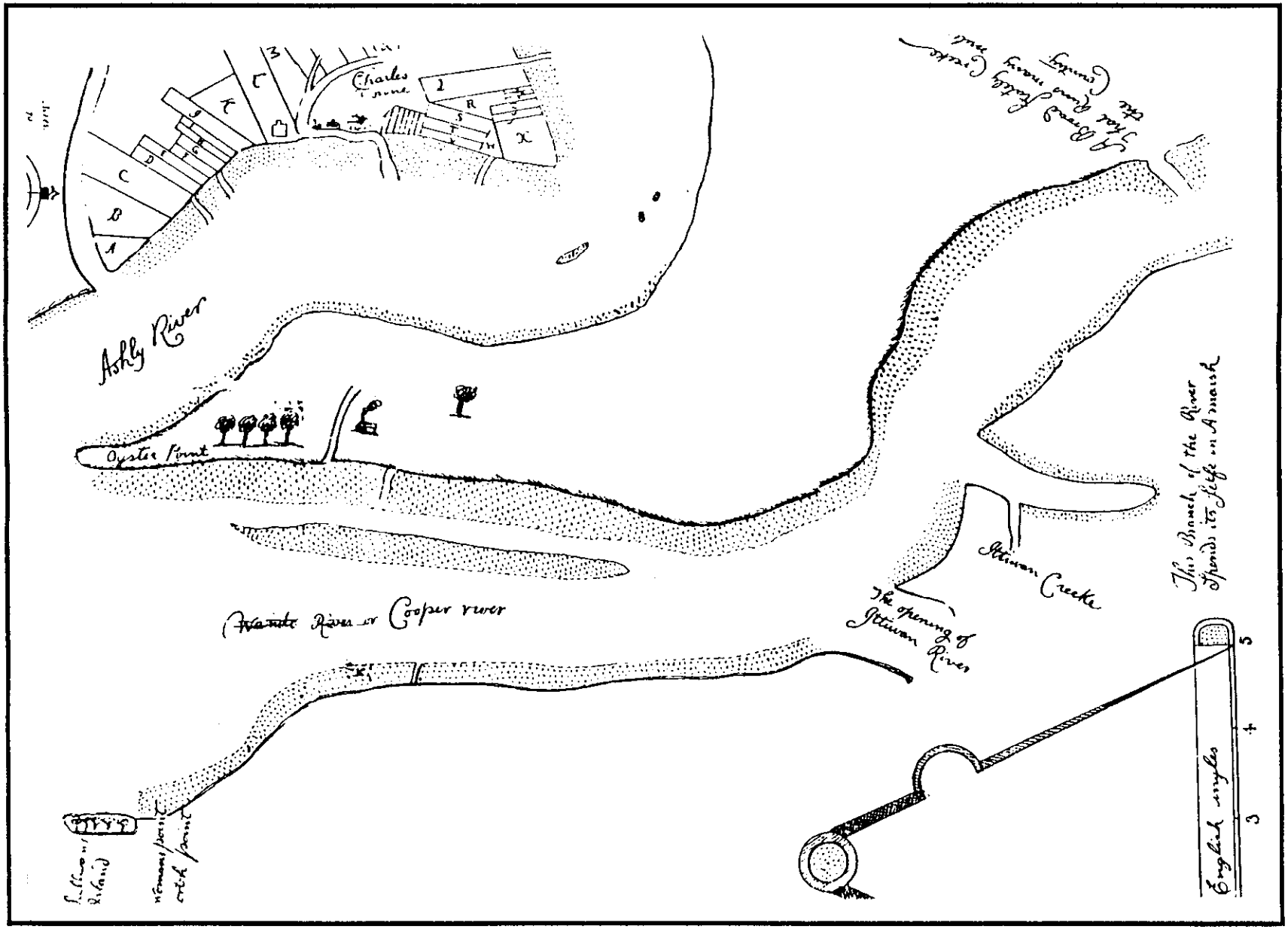


Figure 2. **John Culpeper Map of Charles Towne, 1671.**

strategic security, being an area easily defended by land and sea, as well as an increased commercial position (Sellers 1970:5). In 1680 one observer noted that:

> The cituation of this Town is so convenient for public Commerce that it rather seems to be the design of some skillful artist than the accidental position of nature (Zierdan *et. al.* 1986:2-14).

The harbor, although somewhat shallow, provided a good anchorage and easy access. In addition, the rivers and their tributaries allowed the development of regional commercial activities. This included activities within South Carolina, as well as North Carolina. The limited navigability of most North Carolina waterways, combined with their northwest flow, made it easier to ship out of South Carolina ports, such as Charleston, than North Carolina ports (Zierdan et al 1986:2-15).

By 1695, colonists had settled outlying areas, usually along waterways, such as James and Edisto Islands, and the area surrounding Hobcaw and Shem Creek (Figure 3). The colony's method of land acquisition, based on the land grant and headright system, proved ideal for the formation of large plantations. By 1700, colonists began to develop plantations and settlements along the Ashley, Edisto, and Santee Rivers (Zierdan et al 1986:2-15). Although the lure of commercial gain fueled small-scale expansion, the continual threat of Native-American and Spanish attacks limited extensive settlements outside a thirty mile radius of Charleston (Hartley 1984:10).

Although the colony's early agricultural ventures focused on subsistence, the proprietors continually encouraged the development of a profitable export staple (Calhoun 1982:33). Initially, cattle, other livestock and skins from the burgeoning Indian trade, were the colony's primary exports (Calhoun 1982:33). Charleston's extensive fur trade with the Native-American inhabitants resulted in the exportation of more than 60,000 deer skins in 1699 (Rhett 1940:23). Consequently, Charleston became the entrepot of the southern Native-American country that lay several hundred miles to the west and southwest (Sellers 1970:25).

During the first quarter of the eighteenth century, the colonists also experimented with the development of rice as a commercial crop. Once they determined that the crop was ideally suited to the area's low-lying swamplands, rice replaced skins as the leading export in Charleston's economy (Sellers 1970:6-7; 150). By 1729, rice and indigo had become the major cash crops of a rapidly developing plantation system (Orvin 1961).

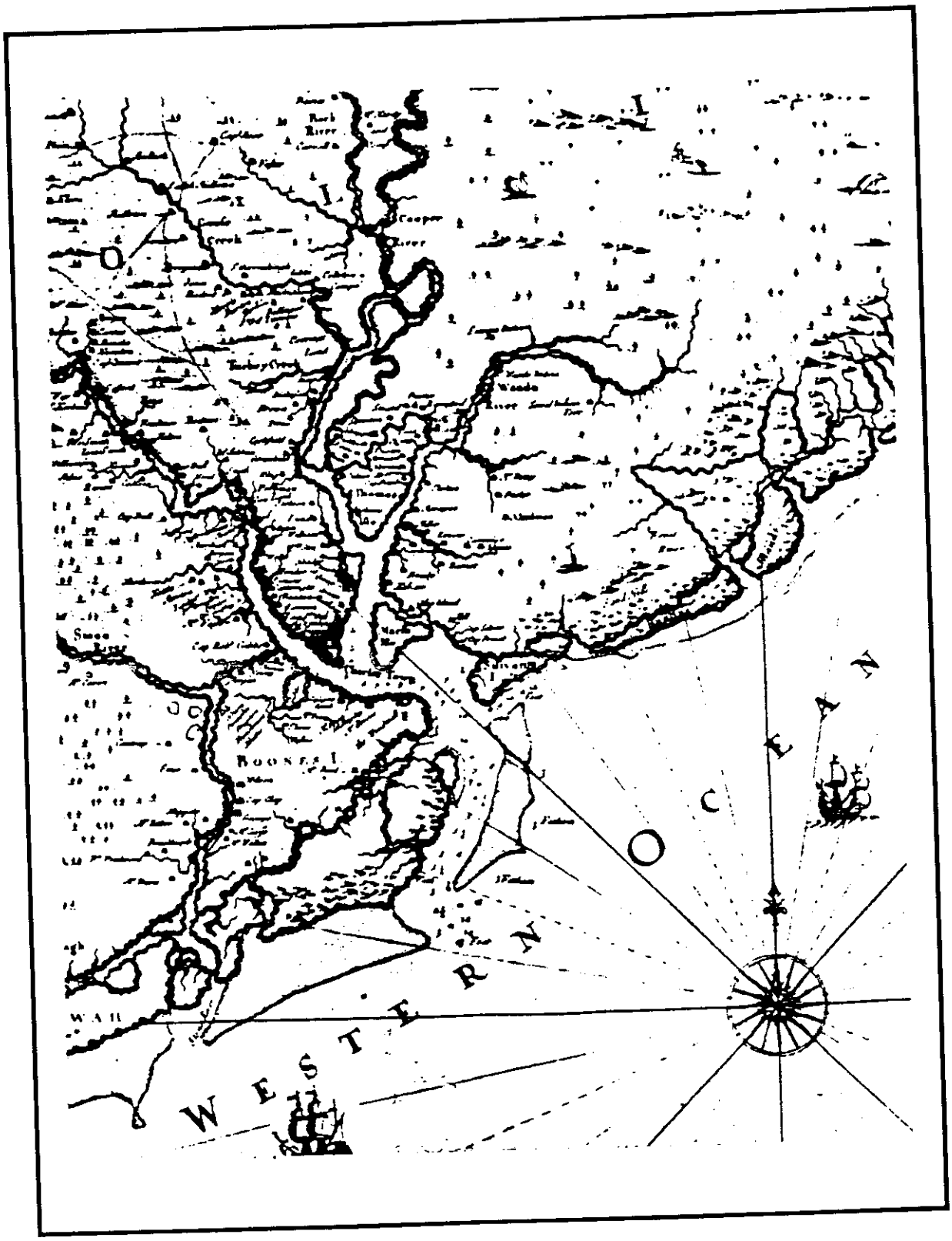


Figure 3. Thorton/Morden Map of South Carolina, Ca. 1695.

During the 1730s, Charleston, with it's growing economic base, evolved from a frontier settlement into a regional commercial center and port. The colony's inland expansion, combined with its profitable cultivation of rice and indigo, brought a measure of financial stability to Charleston. Charleston merchants and factors reinvested in the economy, thereby accelerating economic progress (Calhoun 1982:34). Charleston's economic growth continued throughout the eighteenth century. Maritime activities also developed at a rapid pace. During the 1730s, Charleston merchants loaded 220 ships annually for Europe, in competition with northern commercial centers, such as New York, loading 196 ships in 1732 and Philadelphia, loading 173 in 1733 (Sellers 1970:11).

Charleston became the trade center for the prosperous tidewater region. Charleston merchants carried on back-country trade with inhabitants of western North and South Carolina and coastal trade with the tidewater section of North Carolina, particularly the Cape Fear area. Charleston thus became the commercial capital of an immense region. By the middle of the eighteenth century, Charleston planters, in pursuit of large scale staple farming, utilized vast numbers of African slaves. The lowcountry along the sea coast consisted of sand, pine barrens, and swamps. Here, rice and indigo were cultivated by slave labor on plantations that ranged in size from 3,000 to 40,000 acres. These products were then transported, usually by water, to Charleston and exported directly to Europe. In 1751 Governor Glen described shipping on the Cooper River. Glen stated, the "...Cooper River appears sometimes a kind of floating market, and we have numbers of Canoes, Boats, and Pettygues that ply incessantly, bringing down the Country Produce to Town and returning with such Necessarys as are wanted by the Planters" (Sellers 1970:5).

The western settlers of North Carolina and Georgia also shipped produce to Charleston, rather than to Wilmington or Savannah (Weir 1983:49-51). Charleston's growth as a regional market also increased the port's significance and development. In 1755, approximately 300 ships of various types and sizes entered the port of Charleston annually. By 1760, 245 vessels entered the port; in 1765, that number increased to 450 and remained relatively constant through 1770. In that year Lieutenant Governor Bull wrote to the Earl of Hillsborough that Carolina's commerce kept "equal pace with its agriculture, that its trade extended to all parts of the world consistent with the navigation acts, and that now near 500 sails of vessels" were employed in the export of produce and import supplies and manufactured goods (Sellers 1970:11-12).

The British acquisition of Florida in 1763 opened a new trade territory for the Charleston District, as well as new investment opportunities for Charleston merchants and planters. The lack of a good harbor resulted in the commerce of eastern Florida being routed through Charleston. In addition, vessels regularly sailed between Charleston and Pensacola, located on Florida's west

coast. These commercial activities compensated for Carolina's declining fur trade, caused by a depletion of animal resources in the colony's piedmont region (Sellers 1970:44-45).

Like most agricultural districts, Charleston's trade was seasonal. Charleston's commercial activities were highest from January through May, when rice was in greatest demand in Holland, Germany, and Flanders. Also during those months cargoes of African slaves were arriving for planters who were beginning new crops. From June to autumn business was relatively slow. The South Carolina Gazette of 10 September 1763, reported "44 sail in the harbor - 17 ships, 1 Billander, 6 schooners, and 10 sloops," ..."the greatest number ever known to be here at this time of year."

Water travel provided planters with the most efficient means of transportation. The region's rivers and creeks became floating highways with a wide variety of vessel types. Planters utilized vessels such as sloops and schooners for coastal transportation, and smaller boats, such as canoes and flats for inland riverine transportation. The South Carolina Gazette of 27 June 1768, noted:

> It has been computed that there are (built and owned in this province) upward of 130 Boats and Schooners, three-forths of them deck'd carrying from 10 to 50 tons at 4 barrels of rice to the ton, employed in bringing the Country Produce to this market,...And their burthen together is reckoned 3,500 tons.

Vessels employed in the Charleston trade represented three classes: inland, coastal, and ocean-going. Interior trade was carried out by inland boats of a few tons burden, as large vessels risked being grounded on the shoals in the rivers. These vessels included canoes, periaugers, and flats. The largest of the inland boats had trunk masts that had to be folded when they passed beneath bridges. These vessels provided the colonists with an effective form of communication and transportation. Products from plantations in the maritime parts of the province were transported to market in vessels with standing masts, decked to protect the produce from the weather. These "decked periaugers" were essentially coasters, some of them as much as 50 tons burden. Similar vessels, some as much as 70 tons burden, carried on the coastal trade (Rogers 1969:3-5; Sellers 1970:63-64).

Sloops and schooners probably comprised the largest portion of coasting vessels. These vessels were single and double masted respectively, and designed to operate in a variety of environments. Due to the shallow inlets and rivers of the lowcountry, shipbuilders produced shallow draft sloops and schooners. A vessel's carrying capacity and sailing qualities in variable operating conditions were critical features to the planters. Much of the rice and indigo cultivated on plantations were transported to Charleston in

schooners. An example of plantation schooner usage is provided by eighteenth century merchant Henry Laurens, owner of two plantations. Laurens employed two schooners. One schooner, the *Baker*, operated from Laurens' Mepkin plantation on the Cooper, while the other, the *Wambaw*, served his Wambaw plantation on the Santee River (Harris *et. al.* 1993:16).

Ocean-going vessels, usually employed in the European trade, ranged from 200 to 500 tons, although the latter was considered a very large ship. These vessels included ships, snows, brigantines, and larger schooners and sloops. Most of those vessels transported from 1,000 to 1,200 barrels of rice, or 250 to 300 tons. A visitor to the port during the height of the 1773 shipping season noted, "The number of shipping far surpasses all I had seen in Boston. I was told there was not so many as common at this season, though about 350 sail lay off the town..." (Quincy 1773:424-481). Foreign vessels often stayed in Charleston from one to three months, during which time the cargo was unloaded and the vessel overhauled for the return voyage (Rogers 1969:7-8).

Because the navigable waters of the Ashley and Cooper Rivers extend so far inland, some coastal traders, and even ocean vessels, traveled well into the heart of the plantation country. For example, an English traveler in 1774 described Dorchester as "a pretty good sized town, upon Ashley River about 20 miles above Charles Town, and navigable all the way up to it...for vessels of above 100 tons burthen" (Mathew 1992:97n). Approximately five or six miles above the town of Dorchester, Bacon's Bridge represented the "head of sloop navigation" on the Ashley River (Mathew 1992:95-96). The Cooper River provided even greater inland access, as its navigable headwaters, near Biggin's Creek, were some 40 miles from Charleston (Mathew 1992:68).

The lengthy inland navigation of the Ashley and Cooper Rivers presented several advantages. For one, vessels could sail up the river as early as March and wait for the next crop of rice, due the following October or November. A common anchorage was near the town of Childsbury, approximately 37 miles up stream on the east bank of the Cooper River's western branch (Smith 1913:198-203; Edgar 1972:117,407). In June 1744, Charleston merchant Robert Pringle reported that despite it being so early in the year "Eight or Ten Sail....Lye [at Childsbury] till next crop." In addition, anchoring in the Cooper River was a useful technique for vessel maintenance. The fresh inland waters of the river rendered shipping a partial haven from the ship worm, *teredo navalis*, and the threat of hurricanes (Edgar 1972).

During the mid-1700s Charleston's primary plantation products and exports were rice, indigo, naval stores, and to a lesser degree, deerskins. Indigo was a particularly valuable commodity. In the years 1774 and 1775 Charleston exported more than a million pounds of indigo (South Carolina Gazette 26 December 1774 and 20 February 1775). A 1767 edition of the *South Carolina Gazette* published the following description of a vessel transporting indigo:

> The Ship *Beaufain*, Capt. Daniel Curling, cleared since our last for London, has on board no less than 394 casks containing 141,009 pounds weight of net indigo (Supposed about one third of the crop) besides 751 barrels of rice, 14 hogsheads and six bundles of dress'd deer skins, 17,779 pounds of hemp, 32 Barrels of Turpentine, 5 boxes of seeds, and other articles, and it is reckoned the richest ship that has sailed from this port...(Sellers 1970:164).

Rice was another important staple crop. During 1769 Charleston exported to Europe 123,317 barrels of rice. Of these, Portugal received 24,264 and Spain 5,046. This seems to indicate that Southern Europe was a significant consumer of Carolina rice in that year (MacPherson 1805). In the Americas, the largest customers for Carolina rice were the West Indies, which sometimes consumed more than all of Southern Europe. Small quantities were purchased by New York, Pennsylvania, and Rhode Island, which were involved in the rum and slave trade between the West Indies, Africa, and America. Ships from these colonies frequently landed at Charleston to sell slaves and rum, as well as to acquire rice.

While Charleston continued to export indigo, rice, and deer skins, hundreds of other items were imported into Charleston. During the 1760s Charleston's newspaper carried the advertisements of merchant James McCall, who imported items from Bristol. These included saws, iron pots, bullets, gunpowder, window glass, nails, canvas, drugs, bird fountains, hearth tiles, bridles and whips, bowls, decanters, tea and coffee pots, candlesticks, ale, Gloucestershire cheese, candy, gloves, shoes, "handsome flowered silks," "silk umbrelloes," ribbons, India bordered chintz, and "a great variety of useful articles" (Fraser 1976:11).

Not all areas of the Charleston region were equally suited for indigo and rice. While the Cooper River drainage basin supported these cash crops, the Wando River basin, which extends twenty miles northeast of Charleston, was too wet, poorly drained, and saline to support large scale rice cultivation. Similar conditions also exist along the western and northern shorelines of St. Thomas and St. Denis parishes in Berkeley County (Wayne 1993:81).

Although unsuitable for rice and later cotton, the Wando River basin possessed an abundance of brick making resources, including suitable clay, sand for temper, fuel for kilns, and labor, specifically plantation slaves. In addition, the Wando River provided excellent access to Charleston markets, a crucial element for developing the region's brick making industry (Wayne 1993:81). A 1747 *South Carolina Gazette* advertisement illustrates the available brick making resources along the Wando River:

> To be sold...the Plantation where the Subscriber now lives, convenient to a good Landing on Wando River...also great convenience for Brick Works, there being excellent Clay close to the Landing with Plenty of Wood at Hand for burning (Stine *et. al.* 1993:81)..

Other areas of economic activity within the Wando basin focused on produce and livestock, as well as firewood, timber, and naval stores (Wayne 1993:81, Scardaville 1985:35-42). Whether rice, bricks, or lumber, colonial planters and merchants depended heavily upon the waterways, their primary transportation network. Without access to the waterways, and the upriver raw materials, Charleston's economy would have stagnated.

Revolutionary Period

Military and political activities associated with the American Revolution interrupted Charleston's commercial development. The initial effect was felt late in 1769, following the colonial adoption of a general boycott of British goods. By December of that year, imports had declined by more than 50 percent and the usual bustling harbor of Charleston was virtually empty (Fraser 1976:45). Although the boycott was repealed approximately one year later, the ensuing political and military upheaval produced long-term effects for the port of Charleston and the surrounding area.

From the war's outset, naval and commercial shipping in the Charleston area were jeopardized. In the fall of 1775 the Provincial Congress, fearful that British warships in the area might attempt an assault on Charleston, ordered a blockade of the main channels to the harbor. A second measure taken in an attempt to help defend Charleston was the creation of the South Carolina Navy. By early 1776 the schooner *Defence*, the brig *Comet*, and the ship *Prosper* had been converted and armed to patrol the waters in and around Charleston (Clark 1968 III:1310 and Naval Documents of American Revolution Vol. III 1968: 133, 177 and 623). Shortly thereafter, the naval situation was intensified with the arrival of a British force under the command of General Sir Henry Clinton and Sir Peter Parker. In spite of the impressive nature of the British fleet, efforts to capture the city failed primarily due to the complexities of navigating in the shallow inlets and skillful American defense of the fortifications on Sullivans Island. "Thus", a British officer wrote, "was the Invincible British Navy defeated by a Battery which was supposed would not have stood one Broadside" (Fraser 1976:91-92).

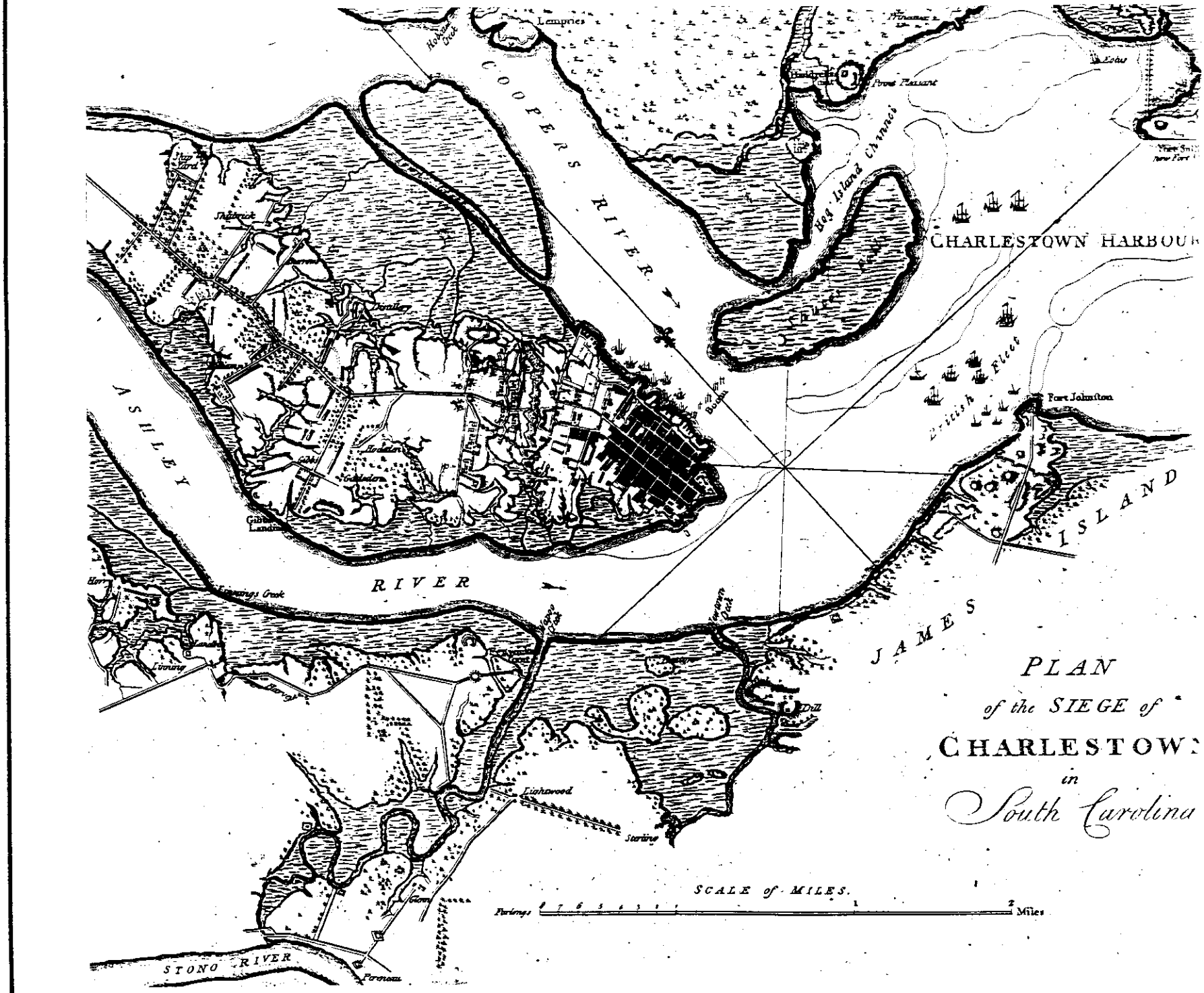
In December 1779, commanders of the Continental forces received reports that the British were preparing another offensive against Charleston. American efforts to strengthen the existing fortifications on Sullivans Island,

Haddrells Point, and James Island, and to construct a line of trenches, batteries, and oyster shell and mortar redoubts linking the swamps and rivers to the east and west of the peninsula were justified on 14 February 1780, when a British fleet moved into the North Edisto River and landed 6,000 troops at what is now Seabrook Island, approximately 20 miles from Charleston.

In early March, Fort Johnson on the northeast end of James Island fell to the British. That left them in command of the southern approach to Charleston Harbor and the west bank of the Ashley River (Weir 1983:331-332; Fraser 1976:119-121). The arrival of 700 North Carolina Continental troops in the city gave brief hope to the residents of Charleston but General Lincoln realized that the four armed frigates and the barges in Charleston harbor were no match for the British warships that lay off the harbor bar. He, therefore, ordered eleven vessels, including the four armed frigates, scuttled near the mouth of the Cooper River with a boom strung to connect the masts of the submerged ships (Figure 4). It was not until 20 March that the British warships crossed the bar into the harbor (Middleton Papers, Caroliniana Manuscript Collection). By 3 April 1780, Clinton's troops had moved across the Ashley and established a two mile long line of trenches and redoubts. The British then occupied positions connecting the Ashley and Cooper Rivers.

During the next several days the British moved heavy artillery closer to Charleston. British guns began a bombardment of the town on the morning of 13 April, leaving General Lincoln to consider an evacuation of the town. However, by the next day all territory east of the Cooper River was in the hands of the British, and Charleston was completely encircled. The British began their final bombardment on the evening of 9 May. The assault continued throughout the night and into the next day. As the British prepared for an assault on the town on the afternoon of 11 May, a white flag was hoisted by the Continental forces. The next afternoon, General Lincoln surrendered approximately 5,500 troops, their weapons, ammunition, and stores. The last open seaport had fallen to the British. Charleston remained under British control for the next two years.

At the beginning of the revolution South Carolina lacked the necessary ships for defense against the British. A number of ships were either purchased or seized to serve in the South Carolina Navy. It was soon apparent, however, that the state required its own shipyard, to facilitate the maintenance and construction of naval vessels. Prior to the Revolution, Robert Cochran of Charleston established a shipyard on the south side of Shipyard Creek, just north of Belvedere Plantation. In 1777, the South Carolina State Navy, in search of a yard to maintain and repair vessels, leased Cochran's shipyard. However, the yard's small size combined with the temptations offered to workmen by the nearby town soon led the Navy to rethink its plans. By 1778,


Lempries
COOPERS RIVER
Bog Island Channel
CHARLESTOWN HARBOUR
Fort Johnston
ASHLEY
RIVER
JAMES
ISLAND
Lightwood
STONO RIVER
PLAN
of the SIEGE of
CHARLESTOWN
in
South Carolina
SCALE of MILES.
Furlongs
Miles

the South Carolina Navy had relocated its shipbuilding facilities to Paul Pritchard's shipyard on Hobcaw Creek. The navy yard remained in operation until the British occupation of Charleston in 1780. In 1798, naval shipbuilding returned to Cochran's shipyard when a committee of powerful Charleston citizens resolved to contribute a warship to the fast approaching war with France. The following year the 28 gun frigate *John Adams* was launched into the still waters of Shipyard Creek and was soon thereafter presented to the United States government (McNeil 1985:10). After this, however, naval shipbuilding in the Charleston area suffered a prolonged hiatus.

During the war a number of vessels were lost or abandoned within the confines of Charleston Harbor. For example, in 1775, four hulks were scuttled in Hog Island channel and in 1780, eleven more were scuttled in the mouth of the Cooper River, all of which were sunk as obstructions to navigation for military purposes. In addition to the scuttled vessels, two British warships were lost. The first, H.M.S. *Actaeon* grounded off Fort Moultrie in July, 1776, and could not be refloated. Five years later H.M.S. *Thetis* was also lost as the British abandoned Charleston. During the British occupation of Charleston the vessel *Friendship* grounded on the Middle Ground and broke up in 1780, and the privateer *Lord North* and the vessel *Jamaica* sank inside the harbor in 1781.

Ante-bellum Period

Following the British withdrawal in 1782, Charleston's commercial activity increased with the introduction of a new cash crop. Moreover, the withdrawal of the British indigo bounty forced planters to cultivate cotton as the new staple crop (Zierdan *et. al.* 1986:2-28). Experimentation led planters to select the green seed (short staple) and the black seed (long staple) for use in South Carolina (Zierdan *et. al.* 1986:2-29). The invention of the cotton gin, in 1793, enabled planters to develop large scale cotton production, both on the coast and in the piedmont. Consequently, an increasing number of planters devoted their land to cotton. Between 1 October 1799 and 30 September 1800, South Carolina exported more than 6,000,000 pounds of cotton, an increase of approximately 6000 percent over the same period a decade earlier (Petit 1976 I:170).

Large scale cotton production ensured the survival and expansion of the Southern plantation system, particularly surrounding Charleston. Within the plantation economic system, slave labor became a crucial element. This resultant demand for plantation slaves led South Carolina to reopen the African slave trade in 1803. A dependence on slave labor eventually limited South Carolina's agricultural and industrial innovation (Zierdan *et. al.* 1986:2-30).

By 1790, Charleston's population reached 16,000, making it the fourth largest city in America and the unchallenged commercial center of the lower South. The eventual removal of British trade restrictions stimulated unprecedented commercial activity between foreign markets and Charleston. In addition, the nearly continuous state of warfare in Europe from 1793 to 1815 caused a large expansion in the American shipping industry, despite high risks and severe losses.

Efficient water transportation was the cornerstone of Charleston's rapidly expanding position as an agricultural center and port. During the nineteenth century, as in the eighteenth century, there was an abundance of boat and vessel types in Charleston and the surrounding area. Vessel type usually depended upon expected use and environment. Small inland boats, such as skiffs, canoes and batteaus were well suited for use in shallow creeks and streams as well as rivers. Those small craft enabled communication and transportation along the waterways. In 1861 Edmund Ruffin, while traveling through the lowcountry, noted the construction of the ubiquitous flat boat. Ruffin stated:

> Col. Lartigue's carpenters began this morning to build a flat boat (or bateau) which is to be ready tomorrow to convey him & others to an island in the river for a week's hunting. As may be supposed, the building of such a boat is a slight affair, & it rarely is kept for another such use (Matthew 1992:139).

While traveling along the Big Salkehatchie River, Ruffin also described the construction of "canoes," or "sea boats." These vessels, constructed from cypress logs, were used to carry passengers and cargo in the lowcountry. Ruffin noted,

> I saw collected at the bridge several of the enourmous [sic] canoes, each dug entire out of the trunk of a single cypress tree, & which are carried in a rough state to the lower country to be completed. These rough canoes are sawed in two lengthwise, & a central bottom or keel part from another tree used to widen or deepen the vessel. The three parts are secured by inside cross timbers, & the whole dressed over; & thus are made the excellent and beautiful sea boats, still termed canoes, common in Edisto Island which 10 rowers may work to advantage & as many passengers be safely conveyed (Matthew 1992:142).

As cotton production increased, planters utilized vessels known as "cotton boxes," or "box boats," to carry bulky cotton cargoes down river. These vessels, some as large as 60 feet long and 25 feet wide, were cheaply constructed and designed for a one-way trip down river. Typically, upon reaching their destination, these boats were broken up and the lumber sold

(Fleetwood 1982:87). All types of vessels, large and small, played an important role in the region's transportation and economic systems. Consequently, shipping contributed heavily to Charleston's rise as a valuable commercial center and port during the early nineteenth century.

During the early 1800s, Charleston became a depot for European goods bound for the West Indies, as well as West Indian produce destined for Europe. Favorable prevailing winds and ocean currents enabled ships to sail from Charleston to the European continent or Great Britain as quickly as ships from New York or Boston. Even the undeclared war with France at the end of the eighteenth century had little effect on Charleston's trade. Tonnage entering and leaving the port totaled 35,709 in 1796, and climbed to nearly 49,000 tons at the beginning of the nineteenth century. Tonnage continued to gradually increase, reaching a peak in 1808 of 53,011 tons; this in spite of Jefferson's Embargo Act in 1807 (American State Papers: Commerce and Navigation Vol. VII, passim).

Charleston's burgeoning maritime activities were temporarily interrupted by war with Great Britain in 1812. Tonnage which averaged more than 50,000 in the years preceding the conflict dropped to 27,506 in 1812 and 29,477 the following year (American State Papers: Commerce and Navigation Vol. VII, passim). Although the British used warships before the hostilities to patrol the South Carolina coast, they were generally too few to seriously affect shipping. In the fall of 1812 an intensified British blockade began to stifle trade in the port. In October the commanding officer of the Charleston naval station reported that the port was blockaded by four warships (Dudley 1986:534-535). From that time, until the end of the war, the British maintained at least one warship off Charleston at all times. British vessels entered the inlets and river mouths, looting plantations, capturing vessels, and completely disrupting coastwise trade (Wallace 1951:368-369). Under such circumstances commercial river transportation became riskier.

To defend Charleston, the United States Navy utilized the brig *Vixen* and several small gunboats (Dudley 1986:60, 101-102). In addition, privateers occasionally slipped out of the port to prey on British shipping in the West Indies. Although privateering was effective in capturing or destroying West Indian shipping, it had little effect on the blockade. The city's economy and maritime traffic suffered until the Treaty of Ghent in December 1814.

The end of Charleston's cotton boom years, from 1795 to 1819, brought harsh economic reality to many merchants and planters. An 1819 national economic depression effectively ended Charleston's commercial expansion. Few merchants survived the tough economic times of the 1820s (Greb 1978:18, 27). Although the economy quickly stabilized following the depression, the city entered into a lengthy economic decline.

Another factor in Charleston's economic decline was cotton production in the American southwest. As more cotton was produced outside the region, Charleston's port declined in relative importance. As early as 1812, South Carolina's cotton production was beginning to show signs of decline. In that year South Carolina's production, approximately 50 million pounds, totaled only 28 percent of the American total of 177 million pounds (Smith 1958:7). Throughout the 1820s, Charleston's domestic and foreign commerce declined. In 1815, Charleston owned 15,619 registered and 10,578 enrolled tons. By 1829, the aggregate tonnage declined to less than 7,000 tons, a decrease of seventy five percent (Hutchins 1941:243).

By 1828, Charleston's exports dropped to approximately $7,000,000, far less than before the war. In the same year a member of the city council noted that "Charleston...has for several years retrograded with a rapidity unprecedented. Her landed estate has, within eight years, depreciated in value one-half. Industry and business talent driven by necessity, have sought employment elsewhere. Many of her houses are tenantless, and the grass grows uninterrupted in some of the chief business streets" (Wallace 1951:448-449). Although Charleston's 1820 population of 20,000 ranked sixth in the nation, the city grew little in the following half century. As a result of economic distress, the city dropped rapidly from the nation's most populated cities (Goldfield 1982:31).

New York City's enormous expansion of coastal trade was an important element in Charleston's decline as a port. New York shippers, for example, captured Charleston's cotton-carrying trade by developing what was known as the "cotton triangle," a system whereby New York vessels picked up cotton from the port docks of South Carolina and other southern states, carried it to Liverpool, brought European cargoes back to New York, and distributed the imports to the southern ports (Green 1957:22). Rice, along with cotton, declined as an export commodity throughout the 1815 to 1860 period. Charleston steadily lost its commercial strength to New York, and to the emerging Gulf ports, particularly New Orleans.

Charleston's residents, acutely aware of mounting economic problems, made several attempts to improve regional transportation systems and regain economic momentum. In 1829, construction began on a railroad from Charleston to the Savannah River. The Charleston and Hamburg, more than a hundred miles in length, was completed in 1833. Although there was a slight increase in Charleston's inland trade during the 1830s, it appears that the railroad did not contribute significantly (Smith 1958:160). In the following years other railroads were completed, but Charleston's economy remained tenuous.

In order to regain direct trade with foreign ports, a deeper harbor was required. By the 1840s, the harbor and approach channels needed at least a 16 to 17 foot depth in order to accommodate vessels engaged in foreign trade. In 1851 the city, in cooperation with the U.S. Army Corps of Engineers, attempted to deepen the harbor. A hydraulic dredge was constructed and work began. Although moderate success was achieved, the secession crisis and war halted the project (Moore 1981:15-19). It was not until after the Civil War that the main channel was dredged to a uniform 16 to 17 foot depth, but by that time the depth was inadequate.

By the middle of the nineteenth century, Charleston had developed into a banking and manufacturing center, which provided liquid assets necessary to stimulate trade. Successful banks were chartered in the 1830s. Manufacturing was even more successful. In 1850, the city ranked third in the South behind Richmond and New Orleans (Lander 1960:330-351). During the 1850s trade in Charleston began to grow once more (Eaton 1961:241). The combined value of the port's imports and exports increased from $13,381,585 in 1850 to $22,764,907 in 1860, an increase of more than seventy-one percent (Van Deusen 1928:259-260). Unfortunately, the turmoil associated with secession undermined the city's mid-century economic gains.

Civil War

Charleston was a focal point of the social, economic, and political pressures that erupted into civil war following secession. On 20 December 1860, the Convention of the People of South Carolina issued the statement that, "The Union now subsisting between South Carolina and other States, under the name of the 'United States of America' is hereby dissolved." On 15 April 1861, newly organized Confederate forces under the command of P. G. T. Beaureguard attacked the U. S. garrison at Fort Sumter and shelled the fortification into surrender. President Abraham Lincoln promptly declared that a state of open rebellion existed and called for volunteers to preserve the Union. Lincoln also issued a proclamation on 19 April 1861 that confirmed a blockade of southern ports.

President Lincoln's proclamation calling for a blockade of the Confederacy, was viewed as a "paper blockade," because the Federal government did not possess sufficient vessels to carry out such a blockade. The arrival off Charleston of the frigate *Niagara* on 11 May did nothing to halt the passage of blockade runners through Charleston harbor (*Charleston Courier* 13 May 1861). However, the attack and seizure of Port Royal late that year, which gave Union forces possession of one of the best small harbors on the east coast, left no doubt that war was indeed underway. The capture of Port Royal gave Union naval forces a port wherein blockading vessels could be supplied,

repaired, and fueled. It also gave Union naval forces control of the coast from above Georgetown, South Carolina, to New Smyrna, Florida, with the exception of Charleston (Hayes 1961:365).

General Robert E. Lee had been given command of the Confederate troops in South Carolina and was authorized to "use all the resources of South Carolina and Georgia" in order to protect Charleston from the attack that was now certainly imminent. Lee ordered that the inland passes to Charleston be closed and a harbor defense prepared (Freeman 1934:622-623). It was essential that the Charleston and Savannah Railroad be kept operational, thereby permitting the movement of troops from either Savannah or Charleston to the threatened point. The railroad was the lifeline of Lee's coastal defenses. Had a sudden attack on the mainland captured the railroad, the results would have been disastrous for Lee and the Confederacy.

The arrival of additional blockading vessels off the Charleston bar did little to effectively close the harbor. However, in December 1861 sixteen vessels loaded with granite and designated as the "Stone Fleet" arrived off Charleston. The vessels, mostly old whaling ships, were sunk checkerboard fashion across the mouth of the main channel leading to Charleston in an effort to increase the effectiveness of the blockade. An editorial in the *New York Herald* stated, "Charleston, so far as any commerce is concerned except that in small coastwise vessels, may be considered 'up country'" (USONWR XII:421-422). The next day the *Charleston Mercury* carried an article that read in part, "On the occurrence of the first heavy northeaster, after the sinking of the wrecks, the force of the wind, the heave of the sea and the action of quick-sands, will according to all previous experiences dissipate the Yankee obstruction" (*Charleston Mercury* 21 December 1861).

In spite of the questionable effectiveness of the blockade, blockade running was not without tremendous risk. More than a dozen vessels were destroyed in the process of attempting to run into or out of Charleston during the war. Many like the *Flora*, *Flamingo*, and *Presto* were fast steamers purchased or constructed to run the blockade. Despite the blockade the channel remained open, particularly to blockade runners who continued to flout the Union warships. By 1863, Charleston had become the South's major blockade running port. Private companies used the South Carolina port while the Confederate government concentrated its blockade running activities at Wilmington. Between 1 January and 30 June 1863, some 40 steamers entered the harbor and another 32 cleared, taking with them more than 29,000 bales of cotton. During 1863 only 11 ships were lost out of 168 attempts by steam blockade runners to clear Wilmington and Charleston (Wise 1983:223, 254-257). Charleston so dominated early blockade running that the American consul wrote from Liverpool that its capture would be regarded "as the deathblow to the rebellion, and do more than discourage those who are aiding them with supplies and money than any other thing."

Following the defeat of Union troops in the Battle of Secessionville, General Beauregard was assigned to command the Department of South Carolina and Georgia. He assumed this command in September 1862 and immediately began the task of strengthening Charleston's defenses. Modifications were made in both Forts Sumter and Moultrie and additional heavy guns were requested to facilitate control of the harbor. The Confederate Navy also contributed to the city's defenses. After the battle between the *Monitor* and *Virginia* in Hampton Roads, the Confederacy contracted for a large number of armored ships to defend its harbors. Two, the *Chicora* and *Palmetto State,* were built in Charleston and joined the city's defense in October 1862. This naval force would be bolstered with the addition of the ironclads *Columbia* and *Charleston* in early 1864 (Still 1971:79-87, 91, 112). By 1863, the port had an impressive network of defenses including forts, minefields, and warships.

On 30 January 1863 the *Palmetto State* and *Chicora* crossed the bar and attacked the Union blockaders. After a confusing night engagement in which two Union Warships surrendered, but were not taken, the Confederate vessels steamed back under the protection of the city's fortifications. Although the blockade was not "raised," Flag Officer Francis DuPont, in command of the South Atlantic Blockading Squadron, urged that reinforcements be sent (DuPont 1969:416). DuPont was ordered to attack the city after receiving reinforcements which included a powerful force of ironclads.

DuPont's fleet arrived off the Charleston bar on 5 April 1863. Two days later, in line of battle, the fleet steamed slowly toward the harbor. As the entire channel was carefully buoyed so that the gunners on Fort Sumter, Morris Island, and Sullivans Island would know the exact range of the attacking vessel, the Federal fleet came under a barrage of heavy and extremely accurate fire. Nearly all of the attacking Union vessels were damaged and many were disabled during the action. The double-turreted ironclad *Keokuk* steamed within 900 yards of Fort Sumter where its guns were incapacitated and the hull and turrets riddled. The vessel was able to move away but sank the next morning off Morris Island (USONWR XIV:23).

The Confederate victory was short lived. DuPont's warships quickly returned, and blockade running declined. From July until September 1863, only four vessels entered and cleared Charleston, and from September until March 1864, no runners steamed in or out (Wise 1983:257-258). Wilmington replaced Charleston as the center of Confederate blockade running. Nevertheless, up to the war's end, blockade runners occasionally slipped in or out of the harbor.

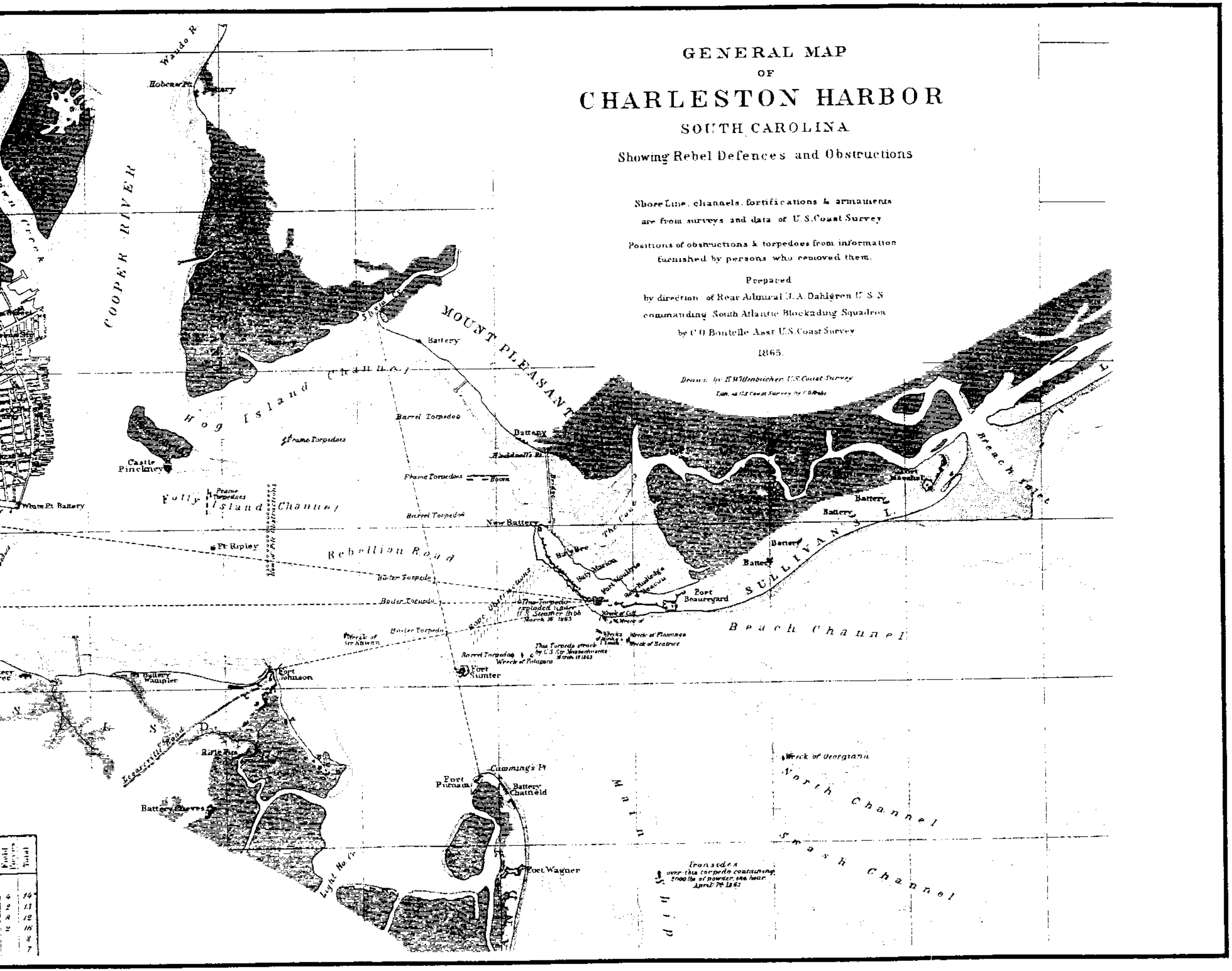
In July 1863, Federal forces launched an assault designed to gain control of Morris Island. The assault was supported by Federal vessels. Faced with overwhelming fire power, the Confederate forces on the island were forced to

withdraw. Realizing that control of Morris Island alone would not provide access to Charleston, General Gillmore, commander of Federal forces on the island, ordered construction of several batteries that would house his heaviest artillery for battering down the walls of Fort Sumter. In anticipation of a bombardment, Beauregard ordered the casements and other areas of Sumter be filled in with wet sand and bales of cotton soaked in salt water. A new sallyport and wharf were constructed west of the city side of the fort (Johnson 1890:180-189). Union forces, with the support of the monitors *Passaic* and *Patapsco* began shelling Fort Sumter on 17 August. Although the firing abated somewhat at dusk, Union forces shelled the fort for most of the night. Upon inspecting Fort Sumter after the first day's shelling, the fort's commanding officer found that seven guns were disabled and the masonry had been damaged extensively (USONWR XIV:453).

The next several days progressed in the same manner, with damage to Sumter becoming more and more apparent. During the lull in fighting that followed an abortive attempt by Federal forces to storm Forts Sumter and Wagner, efforts were made to strengthen the harbor defenses (Figure 5). Early in October, the Confederate Ram *David*, under the cover of darkness, left Charleston Harbor and rammed its spar torpedo into the side of the Federal vessel *New Ironsides*. This effort nearly swamped the *David* and did not inflict serious damage on the Federal ship. For months, the daily bombardment of Fort Sumter and Charleston continued. The constant shelling, coupled with damage from the fires that broke out almost daily, caused the Northern press to state that "block by block of that city is being reduced to ashes,..." (Burton 1970:257-259). In addition, the blockade of Charleston had been steadily tightening.

In an effort to inflict damage on the Federal fleet, Confederate commanders decided to employ the submarine *Hunley*. Late in December 1863, the *Hunley* had been ordered to the vicinity of Charleston Harbor. On the night of 17 February 1864, the vessel moved through the channel of Breach Inlet toward the open sea and the Federal blockading vessel *Housatonic*. The night was clear and calm and the *Hunley* was sighted within 100 yards of the *Housatonic*. However, the rapid approach of the submarine prevented the crew of the Federal vessel from bringing any large guns to bear and the *Hunley* seemed impervious to the small arms fire with which it was met. The *Hunley* rammed its spar torpedo into the vessel, blowing away the after part of the ship and caused it to sink immediately in twenty-seven feet of water. The *Hunley* did not return to station and was assumed lost as a result of the action against the *Housatonic* (USONWR XXXV:112-113).

By the end of May 1864, there were 21 Federal vessels anchored at the mouth of Charleston harbor and 24 others anchored in nearby inlets. On the morning of 2 July 1864, Union forces landed approximately 2,500 men on the southern end of James Island under the protection of heavy fire from two



GENERAL MAP
OF
CHARLESTON HARBOR
SOUTH CAROLINA
Showing Rebel Defences and Obstructions
Shore Line, channels, fortifications & armaments are from surveys and data of U.S. Coast Survey
Positions of obstructions & torpedoes from information furnished by persons who removed them.
Prepared
by direction of Rear Admiral J.A. Dahlgren U.S.N.
commanding South Atlantic Blockading Squadron
by C.O. Boutelle Asst U.S. Coast Survey
1865.
Drawn by E. Willenbucher U.S. Coast Survey
Wando R.
Hobcaw Pt.
Battery
COOPER RIVER
MOUNT PLEASANT
Battery
Hog Island Channel
Barrel Torpedoes
Frame Torpedoes
Castle Pinckney
Frame Torpedoes
White Pt. Battery
Folly Island Channel
Barrel Torpedoes
New Battery
The Cove
Ft Ripley
Rebellion Road
Boiler Torpedo
Rope Obstructions
Batty Bee
Batty Marion
Fort Moultrie
Beacon
Fort Beauregard
Battery
Battery
Battery
Battery
Fort Marshall
Breach Inlet
SULLIVAN'S I.
Beach Channel
Wreck of Flamingo
Wreck of Beatrice
Barrel Torpedoes
Wreck of Patapsco
Fort Sumter
Fort Johnson
Battery Wampler
Legareville Road
Rifle Pits
Battery Cheves
Cumming's Pt
Fort Putnam
Battery Chatfield
Fort Wagner
Light Ho. Cr.
Main Ship
Wreck of Georgiana
North Channel
Swash Channel
Ironsides over this torpedo containing 2000 lbs of powder, one hour April 7th 1863

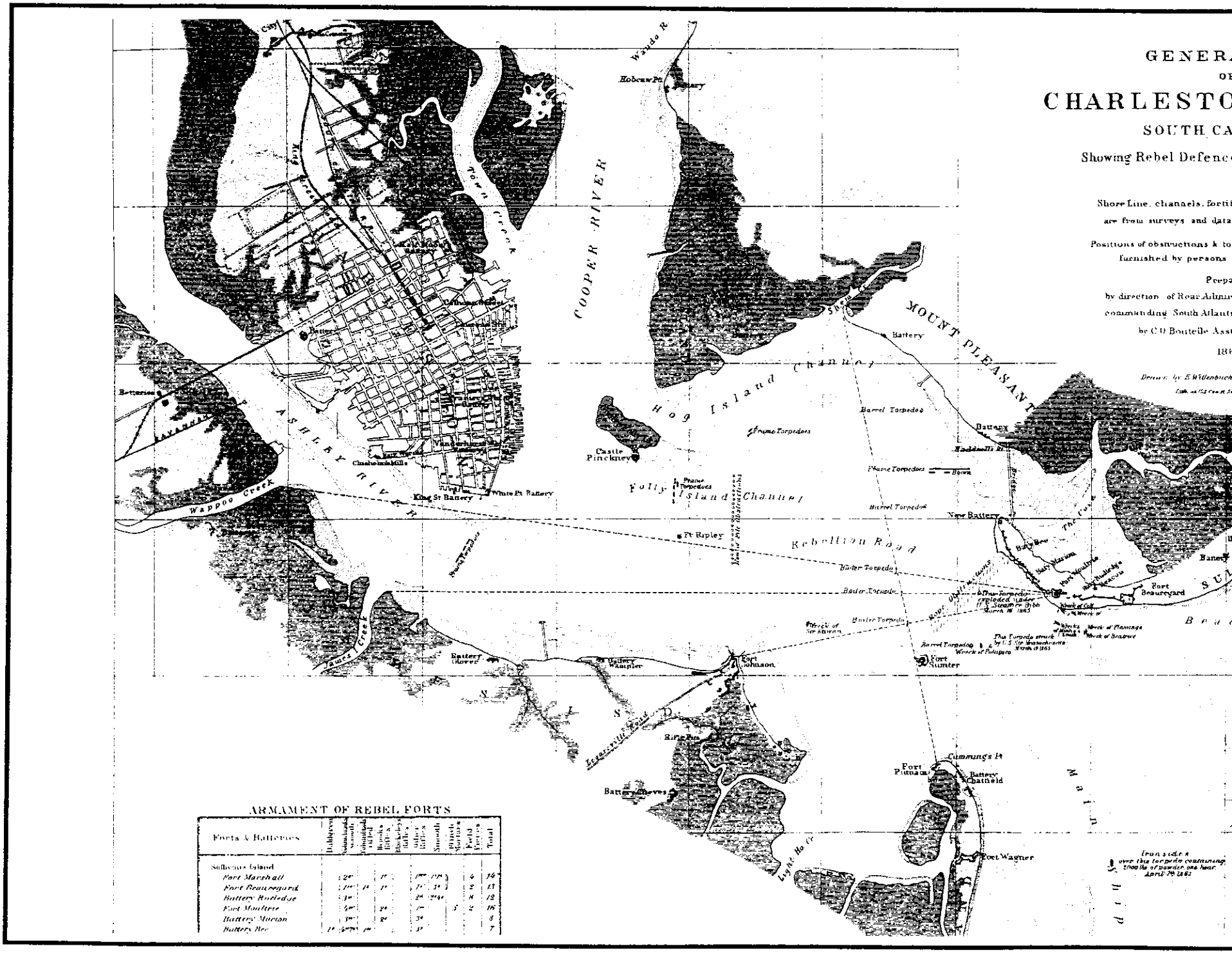


Figure 5. General Map of Charleston, (U.S. Coast Survey, 1865).

monitors and several gunboats. A simultaneous amphibious assault on Fort Johnson ended in failure. During the next two days, skirmishes took place along the Confederate lines across the island, supported by a heavy bombardment from Union batteries on Morris Island and the fleet (USDW XXXV:160). While this and other skirmishes occurred, Fort Sumter and Charleston received severe bombardments which would continue day and night through the first week in September. However, the bombardment dwindled to almost nothing by October. After two and one-half years of relatively steady bombardment, with some of the heaviest guns then employed, Fort Sumter was still impregnable (Burton 1970:308-311).

In renewing the attack on the city, Federal picket boats and at times monitors were sent in to test the obstructions in Charleston harbor. The monitor *Patapsco* struck a mine while searching for obstructions the night of 15 January 1865, and sank in less than a minute. The vessel went down approximately 800 yards off Sumter with only the top of the stack showing above water (Dahlgren 1882:492).

At the end of January, the garrison at Fort Sumter consisted of approximately 300 men. The fort's three guns still commanded the entrance to Charleston Harbor and these, in conjunction with the guns on Sullivans Island and the mines in the harbor, made it extremely dangerous for any vessel to enter. On 10 February, Federal troops again landed on James Island, aided by the heavy fire of the monitors *Lehigh* and *Wissahickon*. At the same time the gunboat opened fire on Secessionville. In mid-February, 18 Federal vessels were sighted off the Charleston bar, 13 of which moved to Bulls Bay to attempt troop landings. The Federal batteries on Morris Island increased their rate of fire on the city, and on 14 February, General Beauregard made the decision to evacuate the city. The evacuation took place on the nights of 17-18 February with troops coming in from the outlying positions as well as from Fort Sumter. The ironclads guarding the harbor were destroyed by retreating Confederate forces to prevent them from falling into Union hands. Upon his entrance into the city, General Gillmore, of the Union Army, noted, "The city itself is little better than a deserted ruin" (USDW XLIV:473-521).

Post Civil War Period

For Charleston, the Civil War proved disastrous. The local economy collapsed during the war. Before economic prosperity returned the city had to rebuild. Charleston would slowly revive partly due to an influx of northern capital. Although commercial vessels entered the port almost immediately after the war's conclusion, normal oceanic trade could not resume until sunken warships and obstructions were removed from the channels. This would not begin until more than five years after the war ended, when Colonel Quincy A. Gillmore, who ironically had played a major role in the

Union bombardment of Charleston, was appointed supervising engineer for river and harbor improvements in the Cape Fear to St. Augustine area. An engineer office was established in Charleston in 1871. As Professor Moore wrote in his history of the Charleston District of the Corps of Engineers, "the devastation of the Civil War made a partnership with the Federal government an absolute necessity for Charleston" (Moore 1981:109).

Throughout his long career Colonel Gillmore was partial to Charleston. He was convinced that the city could become a thriving port again. He was also convinced that extensive harbor improvements would play a major role in achieving that economic revival. His opportunity came in 1877 when southern and midwestern members of Congress aligned together to obtain federal funds for river and harbor improvements. That alliance continued for many years and provided funds for substantial and continuous improvement to Charleston and other southern ports (Moore 1981:32-33).

Gillmore developed a plan for dredging and maintaining a 21 foot channel in Charleston harbor. His plan included using jetties to help natural scouring create the required depth. Gillmore anticipated that once the desired depth had been achieved, the power of the ebb tide would maintain it (Moore 1981:33-35). Between 1878 and 1895 Gilmore's plan was put into effect (Figure 6). Although a channel of depth of only of 17 1/2 feet was achieved, it was considered a success. As Professor Moore wrote, "Charleston at last had a modern harbor, one which could admit the largest vessels afloat. Physically at least, the city was in a position to regain commercial prominence" (Moore 1981, See also Annual Report of the Chief of Engineers 1879:731-738 for Gilmore's plan; and annual reports until 1896 for progress reports).

The port's commerce, of course, had not been dormant during these years. Although it would not reach its pre-war level and prosperity for many years, Charleston's commerce nevertheless recovered rapidly. In 1870, there were two lines of steamers to New York, one each to Baltimore, Philadelphia, and Liverpool, and steamboat connections with Savannah, Beaufort, and Georgetown (Simkins 1966:282). In 1870, exports totaled $10,772,071 and imports $505,609, less than half the 1860 total. Charleston's export trade did not recover its pre-war level until the mid-1870s. Whereas, the import trade remained stagnant until the twentieth century (Moore 1981:157).

By 1880, the city's population reached 50,000, thereby doubling in thirty years. During that period, Charleston's ocean-borne trade continued to climb, averaging more than $20.1 million in exports by 1883. The city's wharves could handle more than 200 ships of all sizes. Cotton, rice, and phosphate were the principle exports. Charleston had still not recovered entirely from

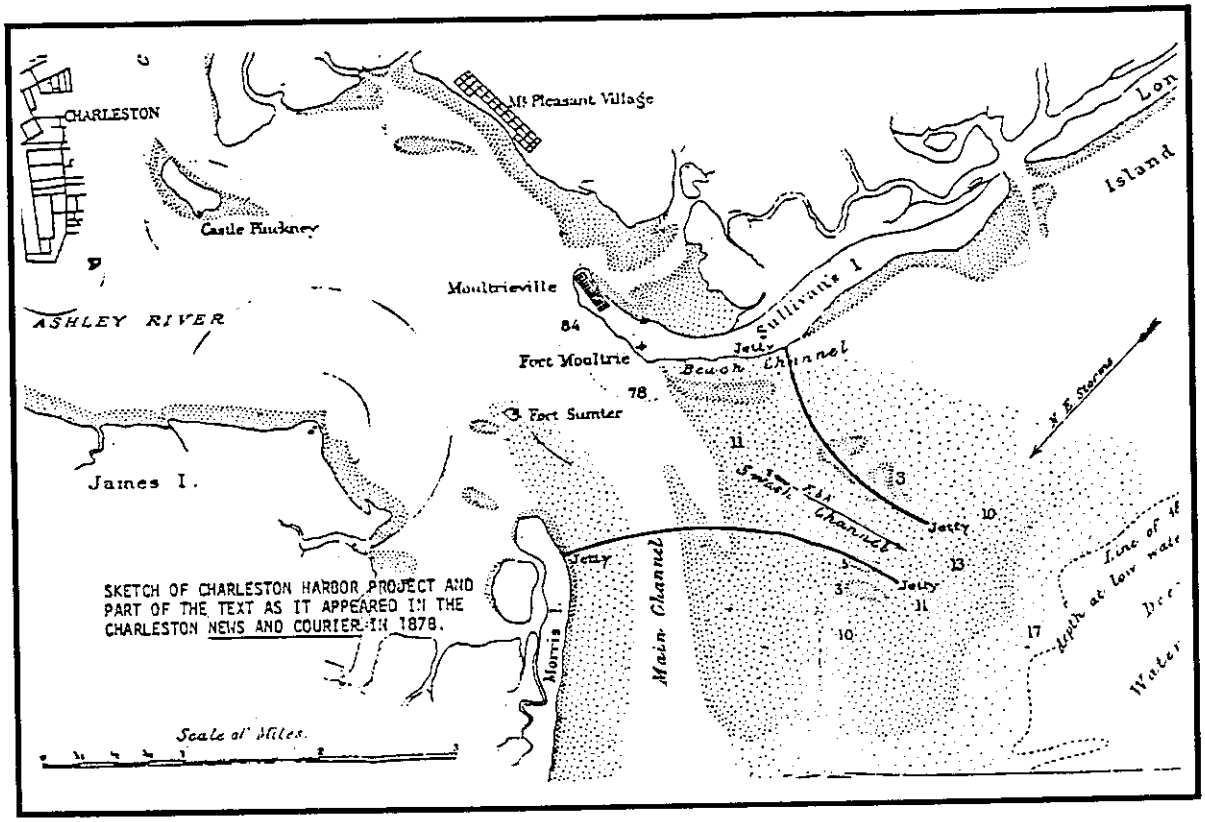


Figure 6. **Sketch of the Charleston Harbor Project, 1878.**

the effects of the Civil War. It had been a manufacturing center in the 1850s, but industry in the city nearly disappeared during the war years. The city would not re-develop a substantial industrial base until the twentieth century.

Ports depended upon an inland transportation system. Railroads began replacing steamboats in importance in the United States during the latter half of the century. During the first decade after the Civil War, railroad mileage in this country more than doubled. The important rail link with Savannah was destroyed during the war by General Sherman's troops and was not operational again until 1870. More importantly the expansion of railroads connecting interior towns with the sea coast seriously affected Charleston's economic future. Railroads would determine trade routes and urban growth. Because of railroad expansion, Norfolk by the mid-seventies had surpassed both Charleston and Savannah, and was third behind New Orleans and Galveston in cotton exports (Brownell and Goldfield 1977:95-96). Also, more and more cotton products moved out of the South by rail. By 1892, Charleston was receiving only 5.67 percent of the nation's cotton crop for export, less than half its 1870 percent. The city's export trade for the 1900 to 1909 period was less than a fourth of the value of the 1885 to 1894 trade (Moore 1981:169).

Twentieth Century

Although the Corps of Engineers worked to create a modern harbor in Charleston, the city's trade continued to decline. The U.S. Navy's decision to locate a naval base at Charleston provided the city with an economic boost and further justification for large expenditures regarding harbor improvements. Although the Union used the captured harbor at Port Royal as an operating base for the South Atlantic blockading squadron, it was not until 1889 that a Navy commission recommended that a new Navy base be built at Port Royal. This new facility would serve the central-southern portion of the United States. A wooden dry dock, which was to act as the corner stone of the new facilities, was begun in 1891, but never satisfactorily completed. Furthermore, the decision to switch from wooden to stone dry docks was made shortly thereafter and rendered this structure obsolete. In 1899, Major Adger Smyth and South Carolina Senator Benjamin Ryan Tillman started a campaign to move the Navy Yard to Charleston. The following year a board of Navy officers under the auspices of the Navy Secretary decided that the Naval Station should be moved to Chicora Park, Charleston (Moore 1981:58-60; Simkins 1966:365-367, 524-527).

To attract the Navy Yard, the City of Charleston arranged for the purchase of land from Chicora Park to Shipyard Creek. Some 760 acres of this area was marshland and was sold to the Navy for the princely sum of one dollar while the remainder was priced at $84,307. On 12 August 1901 the Navy assumed possession of the property. In March 1907, the navy constructed a 583 foot by 97 foot stone dry dock at the Charleston shipyard. Additionally, during the First World War the U.S. Navy built eight wooden hulled submarine chasers, a gunboat and partially completed a destroyer at the Charleston Navy Yard. At its peak, the yard employed 5,600 people.

Despite a lull in the yard's post World War I activities, an influx of post-depression monies allowed the U. S. Navy to develop the yard into a first class facility by the beginning of World War II. Between those wars, the navy constructed a new dry dock and a second shipyard. In addition, during the post World War II era, the shipyard became a submarine overhaul yard, as well as a nuclear shipyard, in 1956 (McNeil 1985:146). Beginning in 1948, the Navy utilized the Charleston Navy Yard for submarine overhauls and surface ship repairs. In addition, naval yard expansion facilitated the development of the North Charleston area.

The port's tonnage varied between six and eight hundred thousand tons during the pre-World War I years. The value of this trade, however, declined from over 100 million in 1910, to less than half that amount in 1914 (Wallace 1951:652). Although World War I reduced the city's transoceanic trade, the return of peace it revived again. During the twenties commerce averaged

slightly under 2.5 million tons. The coming of the Depression affected Charleston as it did other ports throughout the country. Between 1931 and 1941 the port lost 16 percent of its tonnage.

World War II ended this decline, and Charleston, with its large naval base and shipping facilities, boomed economically during the war. As in World War I, the government built massive water transportation centers. Moreover, in 1947, the government transferred these facilities to the city, which, consequently, conveyed them to the State Port Authority (Pender and Wilder 1974:6). As a port, Charleston prospered during the post-World War II years. By 1949, the city's shipping averaged 5,000,000 tons and Charleston once again became the most important southeastern seaport (Sass 1949:62).

Improvements to Navigation in Charleston Harbor

Antebellum Period

Before 1850, the flow of ebb and flood tides effectively scoured ship channels through the harbor bar. Conversely, during the 1850s the channels began to fill with sand, as well as migrate. Consequently, the dynamic nature of those important shipping channels forced Charlestonians to begin a short lived system of channel maintenance by dredging (Moore 1981:20). In 1856, using a prototype dredge, later known as the *General Moultrie,* James M. and Thomas D. Eason removed an extension of Drunken Dick Shoal. Other channel maintenance activities followed the successful 1856 project, but, due to the onset of the Civil War, channel maintenance abruptly ended (Moore 1981:20).

Wreck and Obstruction Removal

Attempts to clear the wrecks and obstruction from Charleston Harbor did not begin until the early 1870s. In 1871 work was initiated to remove several Civil War wrecks within Charleston Harbor, including: the ironclad *Palmetto State,* near the mouth of Town Creek; the ironclads *Charleston* and *Chicora,* in the Cooper River off Marshall's Wharf; the *Patapsco,* sunk in the channel near Fort Sumter; the *Beatrice* and two wrecks, near the inner mouth of Beach Channel; the *Housatonic,* sunk outside the main bar in 4 1/2 fathoms; the *Weehawken,* in the main channel abreast of Morris Island; and the *Keokuk,* near the south end of Morris Island. Also, obstructions made from a torpedo boat and dry dock in Town Creek were also noted for removal. Between 1871 and 1879, 14 ironclads and wooden vessels were removed from Charleston's waters (U. S. Army Corps of Engineers 1871:69; 1872:64-65; 1879:95). These, however, were not the only wrecks removed during Charleston's modernization efforts.

In 1890, Mr. K. S. Tupper contracted to remove a consolidated mass of old guns, chain, bar shot, and other cemented ordnance from an unknown wreck in the south channel on Charleston Bar. The material was removed to provide a channel of 12 1/2 feet below low mean water (U. S. Army Corps of Engineers 1890:1233).

Three wrecks were removed from the upper reaches of the Cooper River in 1893. The tug *B. F. Huger* was reported in the Eastern Branch of the Cooper River and was removed by Mr. Hasell W. Crouch. The other two wrecks, a sloop and a schooner, were located on Quinby Creek, a tributary of the Eastern Branch of the Cooper River. Both wrecks were also removed by Mr. Crouch. The schooner was deposited on the marsh on the north side of Quinby Creek, with a pile driven through its bottom to prevent it from drifting back into the creek. The sloop was broken up and its remains piled above the high water mark (U. S. Army Corps of Engineers 1893:1531).

In 1894 Messrs. Charles W. Johnson and Enoch Townsend were contracted to remove the wreck of the schooner *Kate V. Aiken* from the Swash Channel (U. S. Army Corps of Engineers 1894:174). Only a portion of the wreck was removed by the contractors and after a failure to remove the rest of the wreck the contract was annulled. The remaining portions of the wreck were finally removed by the Merritt & Chapman and Wrecking Company in 1906 (U. S. Army Corps of Engineers 1906:292).

In 1895, contractors, repairing the Ashley River Bridge, removed the mast of a sunken sloop, then lying submerged in 30 feet of water underneath the bridge (U. S. Army Corps of Engineers 1895:1446). In 1899, B. F. Kramer removed the wreck of the tug *Douglass*. The tug sank in the Ashley River at the draw of the Charleston and Savannah Railroad Bridge. The iron-hulled vessel broke in half during removal. The boiler and broken parts of the hull were deposited near the bridge at the low water mark (U. S. Army Corps of Engineers 1899:1550).

In 1904, the *Agostino C*, a converted phosphate barge, was removed from the Ashley River near Lambs. The vessel was dynamited to provide a navigation channel of 14 feet over the wreck (U. S. Army Corps of Engineers 1905:1258). Several other wrecks were removed in 1908. The *Housatonic*, still a hazard to navigation, was dynamited and finally removed from the entrance to the harbor. The *Cambusdoon*, the hulk of an old bark found floating within the harbor, was deposited on Morris Island by the dredge *Winyah Bay* (U. S. Army Corps of Engineers 1908:332; 1090:316). In addition, the tug *Buck* was removed from the harbor, near the coal wharf, and deposited on Hog Island (U. S. Army Corps of Engineers 1910:378).

Charleston Harbor

Corps of Engineers improvement of the Charleston Harbor navigation channels began in 1874. One of the first projects called for removing a portion of Bowman's jetty, which projected into the Beach Channel, and dredging Beach Channel to a depth of 15 feet, all of which was completed in 1877 (U. S. Army Corps of Engineers 1874:4; 1877:67).

The first legislation to improve Charleston's harbor was the River and Harbor Act of 1878. This act provided for the construction of two jetties across the bar channel and auxiliary dredging to maintain a channel depth through the bar of 21 feet at mean low water (U. S. Army Corps of Engineers 1880:126). Work commenced on the north jetty in December 1878 and on the south jetty in 1880. This system of jetties was completed in 1895 (U. S. Army Corps of Engineers 1897:222). The north jetty extended 15,443 feet out from Sullivan's Island and the south 19,104 feet from Morris Island. At the work's completion, the mean low water channel depth was 17 1/2 feet. By 1898, maintenance dredging increased the channel depth to 20 feet below mean low water.

As part of the River and Harbor Act of 1880 three short spur jetties, 700 to 1,000 feet apart, were to be built between Fort Moultrie and the north jetty on Sullivan's Island to prevent beach erosion during the construction of the north jetty (U. S. Army Corps of Engineers 1880:127). However, later examination deemed that only one jetty was necessary, which was built in 1881.

Additional legislation required an increase in navigation channel depth through the harbor. For example, the River and Harbor Act of 1899 approved an increased channel depth and width at the entrance to Charleston Harbor. Specifically, the 1899 legislation called for a channel 26 feet deep and 500 feet wide (U. S. Army Corps of Engineers 1899:253). This project was modified in 1910. The 1910 Act authorized the enlargement of the entrance channel to 28 feet deep and 1,000 feet wide seaward of the jetties and 500 feet between them (U. S. Army Corps of Engineers 1910:375). The River and Harbor Act of 1917 also called for increasing the channel's depth, this time to 30 feet (U. S. Army Corps of Engineers 1917:642). In 1918, the project was modified yet again to provide for a navigation channel of 40 feet deep and 1,000 feet wide from the sea to the navy yard (U. S. Army Corps of Engineers 1919:714). By the end of 1919 a channel 30 feet deep and 600 feet wide, 1,000 feet wide at bends, extended from the deep water in the Cooper to the navy yard.

In 1927, further improvements increased the harbor's commercial capabilities. The River and Harbor Act of 1927 provided for a channel 30 feet deep and 1,000 feet wide from the sea to the inner end of the jetties. From the jetties the channel would maintain a 30 foot depth and 600 foot width to the

navy yard. Beyond the navy yard, a 40-foot channel depth would be maintained up to Goose Creek (U. S. Army Corps of Engineers 1927:610). Also, a 700-foot-wide turning basin was to be constructed at the port terminals, and a 30-foot-deep and 500-foot-wide channel was to be constructed through Town Creek (U. S. Army Corps of Engineers 1927:610). For national defense purposes, the 1927 Act allowed for the channel depth to be increased to 40 feet if necessary. By 1938, all work specified in the Act of 1927, was completed, except the Goose Creek extension. The 1927 Act established the harbor's basic configuration. All following acts either maintained or slightly modified the channel.

The River and Harbor Act of 1940 revised the 1927 Act to include a 35-feet-deep channel from the 35-foot contour in the Atlantic Ocean through Town Creek Channel up to the turning basin at the port terminals on the Cooper River (U. S. Army Corps of Engineers 1940:627). All 1927 widths remained consistent. On the east and north sides of Drum Island, a channel 30 feet deep and 600 feet wide was also maintained. In Shem Creek, beginning at the entrance from Hog Island, to and including a turning basin near the Mount Pleasant Wharf, a channel 10 feet deep and 110 feet wide was included (U. S. Army Corps of Engineers 1940:627). The turning basin was to be 130 feet wide and 400 feet long.

In 1941, the Chief of Engineers recommended a 30-foot-deep anchorage area between Castle Pinckney and Fort Moultrie (U. S. Army Corps of Engineers 1941:606). The 1945 River and Harbors Act included this recommendation. During the 1950s and 1960s the harbor's configuration was slightly modified. The River and Harbor Act of 1954, for instance, provided for deepening the 30-foot channel to 35 feet on the north and east sides of Drum Island (U. S. Army Corps of Engineers 1955:314). The 1960 Act provided for a 10-foot-deep, 90-feet-wide, and 1,150-feet-long channel in Shem Creek from the existing channel. Also, a 10-foot-deep and 90-foot-wide channel was to be maintained from Hog Island to the Atlantic Intracoastal Waterway connection at Shem Creek (U. S. Army Corps of Engineers 1960:377). By 1962, all new projects and modifications were completed.

In 1976, the Rivers and Harbor Act called for a Phase I Design Memorandum stage of Advance Engineering and Design. This design called for deepening the channel to 40 feet from the 42-foot contour to Goose Creek. It also called for the construction of one turning basin, modifications of existing turning basins, deepening and modifications of the anchorage basin, and deepening Shipyard River to 38 feet (U. S. Army Corps of Engineers 1977:7-3). The 1986 Water Resources Development Act restated the 1976 Act, but added a 35-foot channel to the Wando River, with the provision of a 40-foot channel if economically feasible (U. S. Army Corps of Engineers 1987:7-2).

Ashley River

The U.S. Army Corps of Engineers also made improvements to the Ashley River. The River and Harbor Act of 1880, for example, allocated money for dredging two shoals on the Ashley River. The first shoal was Accabee, located approximately 8 miles above Charleston. The second, below the Wando Phosphate Works, was 2 miles upstream of Accabee. The project provided for the establishment of a 10-foot-deep and 150-foot-wide navigation channel through the shoals (U. S. Army Corps of Engineers 1880:127). Dredging to the required depth was accomplished by 1886.

A 1912 Act approved dredging from the mouth of the Ashley River to Standard Wharf. This act provided for a navigation channel 20 feet deep and 240 feet wide (U. S. Army Corps of Engineers 1913:2010). This project was completed on 11 August 1913. In 1914 and 1915, shoaling necessitated redredging of this area. On 21 December 1916, the Chief of Engineers recommended that the 20-foot depth be increased to 24 feet. While this recommendation was not acted upon, the Corps of Engineers conducted routine maintenance dredging to reduce shoaling, primarily near the seaboard Air Line Railway trestle.

In 1936 the Chief of Engineers recommended that a 30-foot-deep and 300-foot-wide channel be maintained from the mouth of the river to the Standard Wharf. This recommendation also included a call for maintaining the channel to the municipal yacht basin at 12 feet deep and 100 feet wide (U. S. Army Corps of Engineers 1936:493). The River and Harbor Act of 1937 allocated funding for these recommendations.

Shipyard Creek

Dredging within Shipyard Creek was first proposed in the River and Harbor Act of 1912. This act called for dredging a 15-foot-deep and 100-foot-wide channel through the upper mouth of the creek into the Cooper River (U. S. Army Corps of Engineers 1913:2011). However, work did not begin until dredging operations on the Ashley River were completed. Consequently, the dredging of Shipyard Creek was completed on 2 September 1913.

The River and Harbor Act of 1925 called for further improvements within Shipyard Creek. This act approved a 1 1/6-mile-long, 18-foot-deep channel from deep water in the Cooper River. The projected width of the project was 100 feet, with increased widths for bends. The act also called for a 500-foot-long and 250-foot-wide turning basin of the same depth (U. S. Army Corps of Engineers 1925:579). Due to the lack of private support, the work was never

completed. The failure to dredge a suitable 18-foot deep channel from the mouth to the upper end of the Gulf Refining Co. wharf stopped work on the project.

New work for Shipyard Creek was recommended in the River and Harbor Act of 1930. This act provided for a 20-foot-deep and 100-foot-wide channel from a point 50 feet above the Tuxbury Lumber Co.'s plant to deep water in the lower river, with additional increases in width at bends (U. S. Army Corps of Engineers 1933:360). The act also authorized a 12-foot-deep and 100-foot-wide channel from the Gulf Refining Co.'s wharf to the Tuxbury Lumber Co.'s plant. This project was modified in 1935. This modification called for a 28-foot-deep and 120-foot-wide channel from deep water in the Cooper River to a point 100 feet above the Gulf Refining Co.'s terminal, with increased widths at bends (U. S. Army Corps of Engineers 1935:508). Also, a 20-foot-deep and 100-foot-wide channel was to be maintained from the Gulf Refining Co.'s terminal to a point 50 feet above the Tuxbury Lumber Co.'s wharf. This project was once again modified in the River and Harbor Act of 1937. The new proposed work called for a 30-foot-deep, 200-foot-wide channel up to the Gulf Oil Corporation's terminal with a turning basin 30 feet deep at the latter point (U. S. Army Corps of Engineers 1937:535). This project was completed in 1939.

The River and Harbor Act of 1945 called for an extension of the previous project's channel. The new work included an extension of the 30-foot channel to the Pittsburgh Metallurgical Co., with a 30-foot-deep turning basin at the upper end of the project (U. S. Army Corps of Engineers 1945:668). This extension was completed in 1951 with periodic maintenance dredging thereafter.

Wappoo Cut

Improvements to Wappoo Cut were initiated in the River and Harbor Act of 1881. This act recommended dredging at the bar to the entrance into the Ashley River, at one place within the cut, a cut-off through the marsh about 2 1/2 miles from the Ashley River, closing three small tidal branches, and building a short jetty at both the Stono and Ashley River ends (U. S. Army Corps of Engineers 1881:171). That project was revised in 1888. The new project called for securing a channel 6 feet deep and 60 feet wide at low mean water. It also provided for training walls at the Stono River entrance, revetting the banks of Elliot's Cut with stone, making another cut through the marsh, constructing three more closing dams and dredging the Ashley River bar to provide a channel 7 feet deep and 200 feet wide (U. S. Army Corps of Engineers 1889:156).

By the end of 1889 there was a continuous 6 foot depth through Wappoo Cut from the Stono to Ashley Rivers, and by 1893 all dredging was completed. Two closing dams were completed by 1892, while a third dam was determined no longer necessary because shoaling closed the proposed dam area. The revetment of Elliot's Cut was completed in 1895. Near the mouth of the Ashley River, however, shoaling remained a problem (U. S. Army Corps of Engineers 1920:690). Consequently, recommendations were made to conduct maintenance dredging at the mouth at the Ashley River, as well as repair the revetments at Elliot's Cut. In 1913, the Chief of Engineers recommended that, as part of the intracoastal waterway, a channel 7 feet deep and 100 feet wide be maintained through Wappoo Cut (U. S. Army Corps of Engineers 1919:712). This project was completed in conjunction with work approved for the Atlantic Intracoastal Waterway.

Folly River

The 1977 River and Harbor Act approved a 9-foot-deep, 80 foot-wide channel in Folly River and Folly Creek, and an 11 feet deep and 100 feet wide entrance channel at Stono Inlet. This project, which began in 1979, consisted of periodic maintenance dredging to maintain the current project dimensions.

St. Stephen Project, Cooper River

The River and Harbor Act of 1968 authorized a study to solve the shoaling problems within the Cooper River and Charleston Harbor. The study approved of diverting most of the Santee River waters from above Pinopolis Dam into the lower Santee River through a canal beginning at Lake Moultrie and extending to the Santee river in the vicinity of St. Stephen, South Carolina (U. S. Army Corps of Engineers 1969:277). The study was completed in 1970 and construction on a new canal and hydroelectric facility were initiated in 1977. The power plant came on-line in 1985 and all remaining construction activities were completed in 1991.

Sawmill Branch

The Saw Mill Branch is a tributary of the Ashley River. A project calling for the excavation of a channel of varying size, with a maximum width of 35 feet, to 15 feet up the Sawmill Branch from a point above its confluence with the Ashley River was approved in 1968 as part of the 1948 Flood control Act (U. S. Army Corps of Engineers 1971:7-7). The project extended through Summerville to a point nine miles from its beginning. All work was completed in April 1971.

Atlantic Intracoastal Waterway

Outside of the work conducted within the harbor and its adjacent vicinity very little specific work has been conduct along the Atlantic Intracoastal waterway within the current project limits. Much of the work was general in nature and comprised large sections of the waterway. The River and Harbor Act of 1902 called for improving the waterway between Charleston Harbor and McClellanville to a depth of 4 feet and a width of 60 feet (U. S. Army Corps of Engineers 1902:246). The act also called for improvements in the section of waterway between Charleston and Beaufort. That work involved improvements to various shoals within the waterway, among them Wappoo Cut. Details of that work has been discussed as a separate project in the Corps reports.

The River and Harbor Act of 1925 modified the existing project between Charleston and Beaufort. This act called for increasing the depth along this entire section of waterway to 7 feet below mean low water and a width of 75 feet (U. S. Army Corps of Engineers 1926:586). The Charleston to McClellanville section was modified in the 1935 River and Harbor Act, which called for increasing the waterway to 10 feet deep and 90 feet wide (U. S. Army Corps of Engineers 1936:480). Finally, the River and Harbor Act of 1937 provided for increasing the dimensions for the waterway between Winyah Bay to Beaufort to 12 feet deep and 90 feet wide (U. S. Army Corps of Engineers 1936:537). Between 1937 and 1993 work on the waterway within the project vicinity consisted of maintenance dredging to maintain the channel at a 12 foot depth and a 90 foot width.

Submerged Cultural Resource Assessment

Implications of Historic Research

An examination of the prehistoric archaeological record, as well as historic documentation, provides some insight into the potential nature and scope of cultural resources within the project area. For example, investigation of the prehistoric archaeological record at Coastal Zone sites in the project vicinity has generated sufficient data to confirm the nature of settlement patterns along the South Carolina coast from the Archaic through the Woodland II period. Although there is a possibility that portions of the prehistoric archaeological record may have survived the inundation process, the high energy coastal environment and relatively fragile nature of South Carolina Coastal Zone sites would appear to offer limited potential for research. Until inundated sites have been identified and investigated we can only speculate about the level of the surviving archaeological record.

Both the Paleo-Indian and Archaic lifestyles were highly mobile, generating minimal archaeological evidence. While lithic material associated with Paleo and Archaic populations would survive the inundation process, the more delicate archaeological evidence would probably be destroyed. While the lithic evidence could contribute to an understanding of the distribution of populations in South Carolina prehistory, site specific data would no doubt be limited. The greater population densities and sedentary lifestyles associated with the Woodland I and Woodland II inhabitants of the Coastal Zone produced a more extensive and complex archaeological record. Lithic, and to a lesser degree, ceramic artifacts would no doubt survive the inundation process and preserve indications of the distribution of Woodland I and Woodland II populations. In addition, some highly stratified sites encapsulated by sediment or shell middens prior to the inundation process could also contain a recoverable archaeological record. Unfortunately, subbottom evidence of these sites would be difficult to identify.

Historical evidence suggests that the submerged archaeological record in the survey area could also contain material associated with maritime activities. From the earliest times of European involvement in South Carolina the volume of river traffic was directly proportional to the prosperity of Charleston itself. This in turn was affected by the political and economic components of the nation in general. Simply stated, when Charleston prospered, commercial activities on the waterways increased appreciably.

Research has shown that throughout history a variety of vessels traveled the waters of the Ashely, Cooper, Wando and Stono Rivers, as well as the smaller creeks. Small inland and coasting vessels would have been common during the colonial and Revolutionary War periods. Unfortunately, specific geographical references to small vessel sinkings are rare. The types of small craft most commonly traveling the area's waterways were also the least likely vessels or shipwrecks to appear in the historical record. It is precisely this scarcity of information, however, that imbues such vessels with greater archaeological significance. Unfortunately, they are also the most difficult to locate as their remains produce a minimal magnetic and acoustic remote sensing signature.

Because of the high level of channel improvement and maintenance activities dating from the last quarter of the eighteenth century, traditional deep water channels serving the port appear to have only marginal potential for significant submerged cultural resources. Historical records confirm that dredging has been extensive since the third quarter of the nineteenth century and economic pressure to maintain obstruction free channels has supported salvage activity since the third quarter of the eighteenth century. Although the traditional navigation channels appear to have limited potential for submerged cultural resources, potential should be high in previously

undisturbed areas. In areas outside the historically maintained channel alignments, economic pressure to remove navigational obstructions would have been significantly reduced, and bottom disturbance activity minimal.

Implications of Cartographic Research

An examination of the cartographic resources confirmed that the Charleston Harbor area is part of a complex and highly sensitive historical environment. The Charleston Harbor basin was rich in colonial and post colonial settlements. Historical and cartographic research indicates that much of the region's river shorelines were marshland before the second quarter of the twentieth century. All of the consulted maps reveal that plantation buildings were located as close to a water source as possible, either on a river bank or on the edge of a marsh. In cases where plantations fronted marshland, causeways typically provided river access. In addition, plantations often maintained their own vessels for transporting goods and people to Charleston, thereby contributing to heavy shipping traffic along the waterways.

In addition, ferries served as an important link in the transportation and communication network of the Charleston area. Ferry landings were, therefore, a common feature on the Charleston area's landscape An important ferry, for example, was located north of the city near Clouter Creek. The Dover-Calais Landings may have served to connect the Huguenot settlements along the east bank of the Cooper River with the English settlements and the city on the west bank. The establishment of Strawberry Ferry on the Western Branch of the Cooper River provided further access to the resources of the hinterland and resulted in the founding of the town of Childsbury.

Charleston developed as one of the major southern port cities. Because of the volume of vessel traffic, shoals at the harbor entrance represented a significant navigational hazard. Maps depicting the harbor's physiographic change through time reveal anywhere between two to six shifting channels entering the harbor. Shoaling was also a problem within the harbor proper. Many ships, sailing in the apparent safety of the harbor, fell victim to the treacherous shoals. The harbor's main channel passed south of Marsh Island, or Shutes Folly Island as it was later named. Marsh Island did not erode to its current configurations until the 1830s, and even then the area remained a hazardous shoal. Although the main channel continued south of Marsh Island, a new channel skirting the northern shore of Hog Island was cut by the river sometime around the Civil War. The main shipping channel was not shifted to its current position, north of Shutes Folly Island, until post-Civil War harbor improvements.

Nature of Charleston's Submerged Cultural Resources

Prehistoric Period

Evidence of prehistoric sites may have survived within South Carolina's waters. While lithic material associated with Native American populations would without question survive the inundation process, the more delicate archaeological evidence would probably be destroyed. This lithic and ceramic evidence could contribute to a better understanding of the distribution of populations in South Carolina prehistory, though site specific data could no doubt be limited. The known inundated prehistoric sites in the Charleston Harbor area consist of little more than artifact scatters.

Evidence of prehistoric watercraft are also a possibility. Native Americans relied heavily on dugout canoes for hunting, fishing, and transportation. These vessels varied widely in size and shape depending on their use. Cypress was the preferred wood for construction, though pine and poplar were also used. At European contact, a typical canoe was 20 feet long and 18 to 20 inches wide. To date at least one prehistoric canoe has been recorded in the Charleston Harbor basin (38 BK 1662, SCIAA Site Inventory Record). Located in a catchment area on the Cooper River above Goose Creek, the canoe represents late Prehistoric watercraft development.

Colonial Period

Vessels associated with the early development of Charleston may be preserved in the numerous marshes, creeks and rivers that make up the Charleston Harbor basin. During the early colonial period the colony relied on small vessels for trade, exploration, and protection. The periauger was a common type of craft in use during that period. This flat-bottom vessel type was built along the traditions of a dugout canoe. They were built up from a keel and garboard strake carved from a single log. They usually contained transom sterns and averaged 40 to 60 feet long (Fleetwood 1982:36). Small shallops, ketches, and sloops built up from a keel and frames carried on the same roles as the periaugers. These vessel types were common throughout the south, and examples of these vessel classes may still survive in the archaeological record.

Trade was carried on by a variety of vessels. While large vessels such as ships and brigs were common to South Carolina's waters, it was small sloops and schooners that carried on the majority of the trade and were favored by local shipwrights. Those vessels were typically under 50 tons, though larger versions were not unknown. Averaging 25 to 50 feet long and 10 to 15 feet wide these small vessels were ideal in the coasting and West Indies trade. There are few known wreck sites which date to this early period of colonial

development. Among the notable examples are the Malcolm Boat (38 CH 803), a possible sloop rigged, small sea going vessel, found at White Hall Plantation. That vessel is approximately 41 feet long and 11 feet wide (Amer 1993).

Ferry Crossings

A number of ferry crossings have been recorded throughout the lowcountry of South Carolina. The development of the colony was intricately tied to a network of ferries. The lowcountry is criss-crossed by numerous streams and creeks. Communication and transportation between the various plantations and Charleston relied heavily on ferries, which also gave Carolinians easy access to the resources in the interior.

An important ferry crossing has been investigated at Strawberry Plantation. That crossing, located 30 miles from Charleston, provided access to the interior of the country and influenced the establishment of Childsbury. The landing is 8 feet wide with a slope of 7° (Barr 1994:83). The principal structural supports consisted of three stacked timbers 20 cm. square. Cross beams were placed every 20 feet along the main beams. A patterned brick floor, three courses thick, had been laid between the timbers. The sides of the floor were supported by support stakes and timbers. While no ferry boats were found in association with the site, vessels found at the Potato Ferry and Browns Ferry containing bow and stern slopes of 7° and 9° respectively suggest that the landing was constructed to fit the shape of ferry ramps (Barr 1994:83).

Plantation Sites

Evidence of activities associated with plantation life survive in South Carolina's lowcountry rivers. South Carolina plantations were intimately tied to the water. The regions waterways were used as arteries of communication, transportation, and commerce. This variety of usage is reflected in the cultural material recovered from submerged and semi-submerged sites. Waterscape features associated with plantation sites include boat landings, sunken or abandoned vessels, causeways, milling stations, and rice fields, dikes, and associated water control systems.

Boat landings and causeways were at the hub of plantation life. While primarily used in conjunction with commercial activities, they were also important social gathering areas. Numerous landings have been investigated in the Charleston area. The Cedar Grove Plantation landing consisted of a lightly built wooden structure filled mainly with soil, but also included shell, gravel and brick (Beard 1993:67). Similarly constructed landings/causeways

have been identified at the Lexington Kiln Site and Archdale Plantation. The preferred method of construction for those landings seemed to have been a filled log crib. Fill material varied according to what was readily available, whether it was soil, brick or ballast stone. Another common feature of those landings were small canals adjacent to the landing for loading and unloading cargo and passengers.

Abandoned vessels are another feature commonly associated with landings. Since landings were high traffic areas it is reasonable to assume that derelict vessels would be abandoned in their vicinity. A wide variety of vessel types can be seen at landings. The Laurel Hill Plantation has no fewer than five wooden plantation barges and one possible ferry associated with it (Beard 1993:75). A small keel barge has been recorded upstream from the Boone Hall Plantation landing. The Malcolm Boat (38 CH 0803), possibly a sloop rigged small sea going vessel, was found near the mouth of a small creek adjacent to a landing associated with the White Hall Plantation (Beard 1993:75). Vessels recorded in conjunction with landing sites provide important data concerning the construction of small southern work boats.

Shipyards

Shipbuilding played an important role in South Carolina's development. Sites associated with shipbuilding provide invaluable information concerning the development of the Charles Town colony and the shipbuilding industry in South Carolina. In the Charleston area important shipyards were established on James Island, Shipyard Creek, and Hobcaw Creek. To date no shipyard sites have been found on James Island, and the remains of the Shipyard Creek site have been impacted by the construction of the Naval Complex along Shipyard Creek. Two shipyards have been documented along Hobcaw Creek. The Pritchard Shipyard (38 CH 1049), which built innumerable merchant vessels, was also the site of South Carolina's state shipyard during the Revolution. The site consists of several wharf structures and a slipway. Because the site fronted directly on the creek there was no need of a causeway, which was a typical feature of most river sites (Beard 1993:70). The Lind Shipyard site (38 CH 0444), located further up Hobcaw Creek from the Pritchard Shipyard, consists of a causeway of heavily-built timber cribbing filled with ballast stone.

Rice Production

The location and investigation of rice gates, and associated water control systems, could contribute important data on rice production in the low country of South Carolina and Georgia. Rice cultivation in South Carolina began in the late seventeenth century. Although initially grown in upland

areas without the aid of irrigation, problems such as droughts and floods caused a shift in rice cultivation to tidal areas by the late eighteenth century. The switch to tidal areas allowed planters to utilize tidal action as a means of draining and flooding the rice fields.

With time, rice field construction became very systematic. While the outside banks followed the course of the river, the check banks, which divided the fields, were constructed as straight as possible (Leech 1988:28). To help control flooding during unusually high tides, the outside banks were built at least one to two feet above the highest spring tide mark (Leech 1988:28). The floodgates, or trunks, varied in size from about 20 to 30 feet in length, extending through the bank of the canal. Although most trunks were equipped with one gate, two gates were not uncommon. For example, if a rice trunk was intended to serve as a flowing gate, then gates were constructed at both ends of the trunk (Leech 1988:28). In addition, larger canals capable of supporting flats would have had two doors on the gate. An example of a rice gate was recorded by the South Carolina Institute of Archaeology and Anthropology in 1985 (38 BK 0858). The gate contained two granite columns, with each column supporting a brick wall. The floor was planked, and the river end of the gate was supported by puncheons.

Flats/Barges

The rice, cotton, and phosphate industries gave rise to the use of barges or flats, a common vessel type throughout the lowcountry. Barges, or flats, were used extensively to carry bulk cargo through the shallow waterways connecting Charleston with the hinterland. Rice flats were built in various sizes depending on their function. Smaller flats were constructed to operate within the fields while larger ones were used in the canals separating the fields and in rivers. Rice flats were typically flat-bottomed boats averaging 12 feet wide and 45 feet long. They were constructed with transverse planks, internal stringers and had angled ramps (Amer 1993). The later canal boats and phosphate barges were larger adaptations of rice flats. Built to carry heavy loads, these vessels were very sturdy, and averaged 60 to 90 feet long and 10 to 15 wide.

Examples of those types of craft survive throughout the Charleston Harbor area. Five wooden plantation barges have been recorded near the Laurel Hill Plantation landing (38 CH 0803). The Houk Barge, was documented by SCIAA personnel in 1992 (38 BK 0062). This 36 feet long and 12 1/2 feet wide barge was heavily built with two layers of planking. Other barge examples include the TOO-2 site (38 CH 0481), Boone Hall Plantation Landing (38 CH 1209), and the Ashley T-4 Wreck (38 CH 0438).

Military Activities

During wartime, naval action resulted in the loss of many vessels in waters surrounding Charleston. As the largest city in the colonial south, Charleston's strategic location and economic importance made it a prime target for British forces. As a direct result of military activities, many vessels were lost in the Charleston area. For example, four hulks were scuttled in the Hog Island channel in 1775, and eleven other vessels, including four armed frigates, were scuttled in the mouth of the Cooper River in 1780. All of these vessels were sunk, for military purposes, as navigational obstructions. In addition, the British lost two warships in Charleston during the war. The H.M.S. *Actaeon* grounded and was abandoned off Fort Moultrie in July 1776. Five years later H.M.S. *Thetis* was lost as the British abandoned Charleston. During the British occupation of Charleston the vessel *Friendship* grounded on the Middle Ground and broke up in 1780. The privateer *Lord North* and the vessel *Jamaica* sank inside the harbor in 1781. A possible Revolutionary War era vessel was recorded by SCIAA personnel at Little Landing in 1988 (38 BK 0861). Approximately 20 feet of vessel structure survives. Two cannon and one swivel gun, dating to the 1770s were recovered in the area.

Charleston was again a focal point of military activity during the Civil War. During the war many ships were lost or sunk as a result of military activity. In December 1861, sixteen vessels loaded with granite and designated the "Stone Fleet" were sunk checkerboard fashion across the mouth of the main channel in an effort to seal the harbor. The Union Navy also lost numerous ships during its blockade of the harbor. The Union ironclads *Keokuk, Weehawkin* and *Patapsco* were sunk during blockading duties and attacks on Fort Sumter. The USS *Housatonic* was sunk outside the harbor by the Confederate submersible CSS *Hunley*, which was also lost during the action. Preceding their withdrawal, Confederate forces destroyed the ironclads *Chicora, Palmetto State*, and *Charleston* to prevent them from falling into Union hands. In addition to warships, many blockade runners were destroyed in the Charleston area. The *Georgiana, Minho, Etiwan, Raccoon, Presto, PrinceAlbert, Flora*, and *Beatrice* were all lost attempting to run the blockade.

Significance of Charleston's Submerged Cultural Resources

Charleston's submerged cultural resources preserve an invaluable record of human activity. Properly investigated, the remains of ships, ferry crossings, landings, inundated habitation sites, plantation sites, and even refuse sites can provide South Carolinians with insight into their past that is not available elsewhere. Sunken ships and small vessels contain a wealth of important information about the ethnic origins and evolution of regional

vessel architecture as influenced by Charleston's unique environment. Regional construction materials and technology also influenced vessel construction. Unfortunately, there are few records associated with the design and construction of eighteenth and nineteenth century vessels used in South Carolina, including the Charleston region. Additionally, only a small percentage of those records have survived in the historical record. Therefore, the archaeological record associated with Charleston's waterways frequently represents the only source of data available to support reconstruction of those aspects of Charleston's maritime heritage.

In addition to the physical remains of vessels, shipwreck sites almost invariably contain rich and varied collections of associated artifacts. Many artifacts, such as navigational equipment, fittings and tools are associated with the vessel itself and reflect the shipboard technology associated with maritime commerce. Other cultural material associated with the vessel may shed light on the life styles of the officers, crew, and passengers. In many cases those personal effects afford our only opportunity to examine their lives aboard ship. The cargoes of lost ships can be equally revealing. In many cases the cargo provides detailed evidence of trading patterns associated with the transitions in our development. Analysis of cargo can identify social preferences, reveal the transformation of technologies far removed from maritime commerce, and help establish the nature of trade.

Although shipwrecks are perhaps the most readily apparent submerged cultural resources in Charleston's waters, the remains of small vessels, inundated habitation sites, water-related structures, and accumulations of refuse and debris associated with onshore activities can be extremely important. Frequently, underwater archaeological sites preserve material that have deteriorated on terrestrial sites. Development is a continuing process and the lives of each generation are often built upon the residue of their forefathers. Until recently, material lost beneath the surface of the water was not accessible and therefore remained relatively undisturbed. Today, however, underwater archaeological sites preserve evidence that has otherwise disappeared.

Threats to Charleston's Submerged Cultural Resources

Threats to Charleston's submerged cultural resources are apparent in a variety of conditions. The Charleston Harbor basin is a high energy environment. The harbor area has a tidal variation of approximately three to three and one half feet. Sites located along the shorelines are extremely vulnerable to erosional forces, whether natural or man-made. Consequently, once exposed, many sites have been lost to erosion. For instance, the Malcolm Boat (38 CH 0803) was initially discovered eroding out of the bank of the Ashley River. Erosional effects, primarily from tides and power boats,

seriously threatened the site. As a result, sand bags were placed around the wreck's exposed portions as a means to protect the surviving wreck structure. Due to erosion and the possibility of vandalism, SCIAA personnel documented the site in 1992 (Amer 1993)

Vandalism constitutes another threat to Charleston's submerged cultural resources. Many of South Carolina's most important wrecks lie in shallow waters within easy reach of the diving public. Because the lure of souvenirs is a strong attraction many wreck sites are damaged and/or destroyed. Relic hunters often use highly destructive techniques. Vandalism at the Little Landing Wreck (38 CH 0861), a Revolutionary War era vessel located south of Moncks Corner serves as a good example (Beard 1991). Documented by SCIAA during the period 1986 to 1989, the Little Landing 1 Wreck was refilled with ballast and left *in situ* to provide divers with an opportunity to explore an eighteenth century site. However, during its 1991 Underwater Archaeology Field School for Sport Divers, SCIAA personnel discovered that divers looking for artifacts had removed the ballast pile and torn loose ceiling planks and frames. In an attempt to prevent further vandalism and stabilize the wreck structure, the vessel was filled with two layers of sand separated by a section of O-link fence. As a result of their actions of a few inconsiderate individuals have deprived other divers of the opportunity to enjoy an important part of South Carolina's maritime heritage. The continued destruction of historic vessels in that manner increases the loss of irreplaceable data.

Archaeological investigation can also be destructive to submerged sites. Even when an archaeological investigation has been designed to minimize impact on a submerged cultural resource, the actual excavation can expedite deterioration. When a vessel has been buried beneath the bottom surface, the deterioration rate slows due to the lack of oxygen. The anaerobic environment hinders the growth of microorganisms that destroy underwater materials. When the wreckage becomes exposed the deterioration rate begins to accelerate. Therefore, it is the responsibility of the researcher to incur as little damage to the site as possible.

Salvage operations are one of the most destructive actions imposed upon historic shipwrecks. Parties interested in salvaging a vessel or its cargo are often times unconcerned with the vessel's historic value. The use of cutting tools and explosives can completely destroy a vessel and eliminate any possibility of recording its construction or artifacts.

Previous Archaeological Research

In July of 1979, SCIAA personnel performed a three week field investigation of a section of the Wando River. The survey included remote sensing operations with side scan sonar and magnetometer, as well as diver investigation of any acoustic or magnetic anomalies. The area, scheduled to be impacted by the construction of new dock facilities by the South Carolina Ports Authority, was found to contain no significant archaeological remains (Albright 1980).

In 1980, Tidewater Atlantic Research personnel performed a magnetometer and diver survey of an area of the Wando River scheduled to be impacted by construction of the Mark Clark Expressway. Of the eleven potential sites located by TAR personnel, five proved to be associated with historic maritime activities. Those included the remains of two vessels (Tidewater Atlantic Research 1980). Also in 1980, the Division of Underwater Archaeology (SCIAA) surveyed the Mepkin Abbey wreck, a nineteenth century coastal vessel located in the Cooper River. The vessel was 48 feet long and 11 feet wide. Researchers spent approximately two weeks surveying the wreck (Wilbanks 1981:151-157).

In 1985, SCIAA and TAR personnel completed an acoustic and magnetic survey in the area where the Ashley River Bridge was constructed. In addition, diver searches were performed in Wappoo Creek, along the James Island Bridge impact corridor. Neither of these surveys revealed any significant submerged cultural resources (Albright *et. al.* 1985).

In 1985, a submerged cultural remote sensing survey was conducted by Tidewater Atlantic Research for the Charleston District Corps of Engineers in the shipping channel from Goose Creek in the Cooper River to the Sea Buoy Red '2C' in the Atlantic Ocean (Watts 1986). A total of 19 remote sensing targets were identified as having characteristics often associated with significant submerged cultural resources. In 1989, eight selected underwater sites in Charleston Harbor were investigated in conjunction with plans to deepen the channel. No cultural material of historical significance was identified. (South Carolina Institute of Archaeology & Anthropology 1989).

In 1987, Tidewater Atlantic Research completed an underwater archaeological investigation in conjunction with the proposed construction of the replacement of the Grace Memorial Bridge Route across the Cooper River. No targets of historical significance were identified in the proposed bridge construction corridor (Watts 1987 and Garrow 1989). Also in 1987, Beard and Irion investigated several magnetic anomalies within Charleston Harbor. None of the anomalies proved historically significant (Beard 1987).

In 1989, Tidewater Atlantic Research under subcontract to Turner Collie and Braden, Inc., conducted historical and cartographic research, as well as a remote sensing and underwater assessment for the United States Navy, Southern Division, Naval Facilities Engineering Command on the west side of the Cooper River adjacent to Shipyard Creek. The survey was designed to assess the potential for finding submerged cultural resources in an area planned for the construction of a homeporting facility for SSN Submarines and support ships. Although 24 remote sensing targets were discovered, none of the targets were identified as historically significant sites (Watts 1989).

In 1991, Tidewater Atlantic Research under subcontract to Turner Collie and Braden Inc., for the United States Department of the Navy (WPNSTA) conducted a literature survey to assess the potential for finding significant cultural resources at the Naval Weapons Station at Charleston, South Carolina. Due to the historical significance of the Charleston area and the fact that there have been no previous historical or archaeological investigations at the WPNSTA, Tidewater Atlantic Research recommended an historic architectural assessment of standing structures and terrestrial and underwater surveys of construction locations in the proposed project area.

In 1992 SCIAA personnel performed the final phase of research regarding the Malcolm Boat, a sloop dating from the last quarter of the eighteenth century or the first quarter of the nineteenth century. Research included historical and archaeological documentation (Amer 1993). Also in 1992, SCIAA personnel and local sport divers carried out a swim survey of a two mile section of the West Branch of the Cooper River. The survey was intended to increase sport diver education as well as locate and assess submerged cultural resources in the two mile stretch of the river (Harris 1993).

In order to determine the impacts of proposed harbor and channel improvements on underwater archaeological sites, the U.S. Army Corps of Engineer District, Charleston contracted for an archaeological remote sensing survey of portions of Charleston Harbor in 1994. Project areas within Charleston Harbor were surveyed by Tidewater Atlantic Research in conjunction with a geophysical remote sensing survey conducted by personnel from the Waterways Experiment Station. That survey resulted in the identification of 32 magnetic and/or acoustic anomalies. Seven were determined to have signature characteristics that are indicative of potentially significant submerged cultural resources. In a modification of the contract, the bar channel survey area was expanded to relocate and identify the location of the U.S.S. *Patapsco*. In March 1995, diver inspections of one target site adjacent to Folly Reach and another adjacent to Clouter Reach identified material generating those signatures as modern debris and geological features.

Resource Area Sensitivity Analysis

Several determinants weighed heavily in the sensitivity assessment of Charleston's submerged cultural resources. First, the project area's tremendous amount of historical maritime activity, throughout the seventeenth, eighteenth, nineteenth, and twentieth centuries, was a primary consideration. Without question, Charleston is one of America's most historic seaports. Moreover, the rivers and creeks surrounding Charleston supported an extensive array of maritime related activities. Consequently, the waterways served as the region's primary transportation network up until the twentieth century. Although the inland waterways are no longer the region's principal transportation network, Charleston remains an important link in the trading network of the southeastern United States.

Second, the high degree of mobility associated with ships creates one of the major problems associated with predicting the location of shipwrecks. Without a fairly specific documentary record, our ability to develop accurate predictive models for shipwreck locations is extremely limited. Given the historically high usage of waterways such as the Cooper, Ashley and Wando, one can not eliminate the possibility of intact shipwrecks in any unsurveyed or undisturbed areas. The possible geographical range of historic vessel locations includes, waterways, such as rivers and small creeks, marshland, and even underneath certain sections of downtown Charleston. Moreover, without surveys, it is virtually impossible to determine the extent of submerged archaeological resources.

Although the ability to accurately predict the location of shipwrecks is limited, the documentation of historically active maritime areas, including landings, plantations and brickyards, provides a useful technique for indicating potentially sensitive cultural resource areas. By examining documentary and cartographic resources one may begin to map cultural activity areas along the waterways and therefore establish areas with submerged archaeological potential. Due to the generally high level of maritime activity on the project area waterways, it must be assumed that a lack of documented historical areas or known archaeological sites does not necessarily provide a contraindication for submerged archaeological resources.

While the nature of the project does not allow the construction of a quantifiable model for assessing areas of resource potential, it is possible to examine the spatial relationship of various factors such as historic activity and archaeological resources and create sensitivity levels or zones. Areas that are unsurveyed, undisturbed, and in close proximity to historic activity areas, appear most likely to contain submerged cultural resources. Consequently, Tidewater Atlantic Reseach personnel examined five factors in determining zones of sensitivity. Those factors included historical activity, known

submerged archaeological sites, levels of previous submerged archaeological survey and levels of previous bottom disturbance and expected population growth within a particular water basin. Ratings included Zone-1 (high sensitivity), Zone-2 (moderate sensitivity) and Zone-3 (low sensitivity).

Overwhelmingly, the majority of the project area's waterways and marshes are classified with a Zone-1 (high sensitivity) rating. In part, that is attributed to the extensive levels of historic settlement along the waterways, as well as the intensive use of the waterways, for communication and transportation, throughout the historic period. The Zone-1 rating is also a function of the project area's limited amount of comprehensive submerged archaeological survey data. Unfortunately, due to budgetary constraints, archaeological survey often arises from a project specific need, such as impact assessments for construction projects. As a result, much of the project area lacks comprehensive survey data, both for the waterways and the marsh.

In general, there were two scenarios that produced a Zone-3 (low) sensitivity rating. Within any given area, for example, the inclusion of extensive archaeological survey combined with extensive bottom disturbance activity, such as dredging, produced a Zone-3 rating. In addition, extended periods of dredging and other bottom disturbance activity such as found near Navy Yard Reach on the south side of the Cooper River, produced a Zone-3 rating. Ultimately, areas with high levels of bottom disturbance combined with negative results associated with extensive archaeological surveys produced a Zone-3 (low) rating.

As additional data is generated by historical and archaeological research, the level of accuracy of the sensitivity zones can be significantly enhanced. Increased data will also ultimately permit more sophisticated predictive models to be developed. As those data are collected, the GIS database developed for Charleston Harbor can be expanded and the zones of sensitivity refined.

Legislation and Regulations Regarding Submerged Cultural Resources

Resource Ownership

The question of ownership regarding submerged cultural resources in South Carolina has been addressed in both state and Federal law. The ownership of submerged cultural resources, such as shipwrecks, is dependent upon whether the resources are located within the boundary of the state. South

Carolina claims ownership of any cultural material located within the state's navigable water and territorial boundaries that include a zone extending three miles offshore.

Three legislative acts, the Abandoned Shipwreck Act, 43 U.S.C. S 2105, the Historic Preservation Act, and the Submerged Lands Act, provide states with rights to submerged materials within their waters. For example, under the Abandoned Shipwreck Act a shipwreck belongs to the State of South Carolina if it is: 1) embedded in submerged lands of the state or, 2) included in or determined eligible for inclusion in the National Register. The Historic Preservation Act established a State Historic Preservation Officer to help protect each state's historical and archaeological resources.

Under the Abandoned Shipwreck Act, the Department of the Interior and National Park Service have issued a set of final guidelines to help states manage shipwrecks in their waters. Those guidelines are advisory only and are as follows:

> Abandoned shipwreck means any shipwreck to which title voluntarily has been given up by the owner with the intent of never claiming a right or interest in the future and without vesting ownership in any other person. By not taking any action after a wreck incident either to mark and subsequently remove the wrecked vessel and its cargo or to provide legal notice of abandonment to the U.S. Coast Guard and U.S. Army Corps of Engineers, as is required under provisions in the Rivers and Harbors Act (33 U.S.C. 409), an owner shows intent to give up title. Such shipwrecks ordinarily are treated as being abandoned after the expiration of 30 days from the sinking.
>
> (a) When the owner of a sunken vessel is paid the full value of the vessel (such as receiving payment from an insurance underwriter) the shipwreck is not considered to be abandoned. In such cases, title to the wrecked vessel is passed to the party who paid the owner.

Under the South Carolina Underwater Antiquities Act of 1991, the State of South Carolina claims ownership of all submerged archaeological historic properties located on or recovered from submerged lands. The Submerged Lands Act of 1953 affirms state ownership of all constantly submerged land within the individual states' navigable bodies of water. The term "submerged archaeological historic property" under section 54-7-620 of the act means "any site, vessel, structure, object, or remains which: yields or is likely to yield information of significance to scientific study of human prehistory, history, or culture and is embedded in or on submerged lands and has

remained unclaimed for fifty years or longer." This term includes, but is not limited to, abandoned shipwrecks and their contents, as well as individual assemblages of historic or prehistoric artifacts.

An additional level of protection is afforded submerged cultural resources that qualify for inclusion on the National Register of Historic Places. Sites determined eligible or included on the National Register are specifically protected by Federal legislation. Site disturbing activities that are related to state and Federal agency responsibilities, or are permitted by state and Federal agencies, are specifically regulated.

To qualify for the National Register of Historic Places, a shipwreck "must be significant in American history, architecture, archaeology, engineering, or culture, and possess integrity of location, design, setting, materials, workmanship, feeling, and association." To be considered significant the vessel or shipwreck must meet one or more of four National Register criteria. These criteria include:

A. Association with events that have made a significant contribution to the broad patterns of our history; or

B. Be associated with the lives of persons significant in our past; or

C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. Have yielded, or may be likely to yield, information important in prehistory or history.

It is apparent that even without positive identification, a wreck under investigation can meet the qualifications listed above and therefore should be considered potentially eligible for nomination to the National Register of Historic Places (National Register Bulletin 20).

Administration and Management Authority

State and Federal law has established ownership of shipwrecks, but it remains up to the State of South Carolina to administer those laws. In South Carolina, under Section 54-7-640 of the South Carolina Underwater

Antiquities Act of 1991, the responsibility for abandoned property on submerged state land is placed under the auspices of the South Carolina Institute of Archaeology and Anthropology. Vessels determined eligible for nomination to the National Register are the responsibility of the Secretary of the Interior under 43 U.S.C. *S* 2105(b). Procedures for nominating a site to the National Register are found within the regulations of 36 C.F.R. Part 63 (National Register Bulletin 20). No single agency administers complete regulatory control for submerged cultural resource management.

The single most important element of a submerged cultural resource management program is the Section 106 Review Process. Sections 106 and 110(f) of the National Historic Preservation Act of 1966 (as amended) require that agencies assess the effects of Federal, federally assisted, or federally licensed projects on properties included in or eligible for inclusion in the National Register of Historic Places. The Section 106 process has been designed to address historic preservation priorities. Information assessment is the initial step in the 106 review process. Following a determination by federal or state assignees (Agency Officials) that a project may adversely affect cultural resources, the Agency Official initiates an assessment of information needed to complete the 106 process. Next, the Agency Official seeks to locate historic properties in the project area. The Agency Official and the State Historic preservation Officer then evaluate whether properties found are "historic" and potentially eligible for nomination to the National Register. If there are no National Register, or National Register eligible properties within the project area, the Agency Official is not required to take further action in the Section 106 process. When historic properties are found, the Agency Official must assess the projects effects upon the historic property. By providing easily accessible site specific and regional information, GIS facilitates a more effective, project specific 106 Review and Compliance process.

All Federal, federally assisted, or federally licensed projects that impact the submerged bottom lands of South Carolina are reviewed through the 106 process. Where the potential for submerged cultural resources appears to be high, or there are known submerged cultural resources in the area, the SHPO may require a Phase I survey. Phase I surveys are generally designed to employ remote sensing equipment such as side scan sonar, sub-bottom profilers and proton precession magnetometers to identify submerged cultural resources. Where targets with magnetic and/or acoustic signatures that are determined to be suggestive of potentially significant targets are identified, additional investigation may be required. That Phase II investigation is generally designed to identify material generating the target signature, collect sufficient historical and archaeological data to support a determination of National Register eligibility and assess the impact of project related activities.

Where National Register eligible submerged cultural resources are identified and proposed project activities will have an adverse impact on the site, Phase III data recovery may be required. Phase III projects are designed to preserve by documentation those aspects of the archaeological record that make the site National Register eligible. In cases where the resource is particularly valuable Phase III research may also be designed to preserve the surviving vessel fabric and/or other cultural material. With occasional exceptions for highly significant resources requiring a unique approach to preservation, Phase III activity usually clears the way for project related activities. All submerged cultural resource related research activity must be conducted by trained personnel that meet professional standards adopted by the Secretary of Interior and identified in Federal Register (Code of Federal Register, Vol. 48, No. 190, 29 September 1983).

Enforcement

The State Historic Preservation Officer and the South Carolina Institute of Archaeology and Anthropology protect South Carolina's submerged historical and archaeological resources. The State Preservation Officer does not physically enforce laws, he or she works in conjunction with federal and state law enforcement agencies. Under Federal law the U.S. Navy, U.S. Coast Guard, U.S. Army Corps of Engineers and National Park Service are mandated with responsibility to enforce Federal laws. The Attorney General and state law enforcement agencies, such as the State Highway Patrol, County Sheriffs Department, Department of Natural Resources, local police and the Ports Authorities, are also empowered to enforce laws concerning submerged cultural resources. The Department of Natural Resources, which controls submerged bottom lands, works in conjunction with the South Carolina Attorney General to enforce South Carolina laws, as well as answer legal questions pertaining to current legislation and regulations set forth by both Federal and state agencies. Enforcement in South Carolina is closely coordinated by the South Carolina Institute of Archaeology and Anthropology.

Summary

Within the realm of state managed submerged cultural resource programs, the GIS database created by Tidewater Atlantic Research for the Charleston Harbor Project represents a prototype . Since GIS is a relatively novel approach to the management and preservation of submerged cultural resources, there will inevitably be a learning curve within the development and use phases of GIS implementation. As a result, the GIS database and management document created by Tidewater Atlantic Research does not

represent a set of definitive answers regarding the identification and preservation of Charleston's submerged cultural resources. On the contrary, the work represents one additional step in an on-going process.

It is increasingly apparent that GIS will become an extremely useful tool for archaeologists and resource mangers. In particular, the use of GIS presents an excellent opportunity to increase the efficiency of submerged cultural resource management. By creating a digital record of important resource information, regulatory agencies will have an increased level of access and useability. Consequently, resource managers may preserve and protect an increased number of important submerged archaeological sites. While GIS will probably never replace hard copy site documentation, the continued development and use of this technology appears certain. As with any technological advancement, user adaptation will at times seem slow, but through continued development and research GIS implementation will prove extremely beneficial for submerged cultural resource mangers. GIS design, implementation, and maintenance, will remain an ongoing process. To be effective, the GIS database will be need to be adopted as the primary reference in the 106 process. It will also need to be periodically updated with new information generated by professional and avocational activity.

The Charleston Harbor GIS database can perhaps best serve as a point of departure. Completion of this project does not complete computerization of Charleston's submerged cultural resource information. At best, it can provide a valuable baseline for implementing submerged cultural resource management within the Charleston Harbor area. That in itself is an important step in the management process.

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